

PYCNOGONIDS FROM ALLAN HANCOCK EXPEDITIONS

(Plates 35-48)

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FOREWORD

The pycnogonids of the Allan Hancock Expeditions reported on in this paper represent specimens collected over a period of several years. Through the kindness of the Allan Hancock Foundation of The University of Southern California I have been able to examine this valuable collection. Some of the specimens here reported upon were taken out of the Hancock Collections by Dr. Waldo Schmitt of the U.S. National Museum, and these also are included in this paper.

This paper is an account of specimens of pycnogonids received from the Allan Hancock Foundation. Most of the species mentioned were collected off shore, at moderate depth. In distribution they are especially from off southern California, the Gulf of California, and near the Galapagos Islands. They are as follows:

- Nymphon pixellae* Scott p. 279
Numerous examples especially off the California coast.
- Callipallene californiensis* (Hall) p. 281
Chiefly southern California coast.
- Anoplodactylus erectus* Cole p. 283
This is chiefly a shore form but was also collected off shore in deeper waters from Newport to San Diego.
- Anoplodactylus californicus* Hall p. 286
This seems to be a deeper water form for the most part. Found along the shores of southern California.
- Anoplodactylus robustus* Hilton p. 288
This seems to be found chiefly in deeper waters off shore in southern California.
- Tanystylum californicum* Hilton p. 291
Chiefly a shore form in southern California.
- Ammothea latifrons* Cole p. 295
This is a more northern form, being found in Alaskan waters, but one was sent to me from Station 1177-40, north of Santa Barbara Island, off the southern California coast, in 40 fms.

- Ammothella bi-unguiculata* (Dohrn) p. 297
 This is perhaps as widespread a species as any pycnogonid. I have found it from Lower California to southern California. It occurs also off Hawaii and Japan, to say nothing of its original description by Dohrn in the Mediterranean. It is chiefly a shore form.
- Ammothella heterosetosa*, new species p. 299
 This is from the Galapagos Islands. Specimens in U.S. National Museum.
- Nymphopsis spinosissima* (Hall) p. 300
 Chiefly along shore, southern California and Lower California.
- Nymphopsis duodorsospinosa*, new species p. 303
 Lower California.
- Eurycyde longisetosa*, new species p. 305
 Off Colombia, South America. U.S. National Museum specimens.
- Pycnogonum hancocki* Schmitt p. 308
 Shore, Galapagos Islands.
- Pycnogonum panamum*, new species p. 310
 Near Panama Canal, Pacific side. U.S. National Museum specimens.
- All measurements are in mm.

Family Nymphonidae Hoek, 1881

Chelifori long, 2-jointed, chelate, with chelae usually held before the mouth. Palpi 5- to 7-jointed, longer than the rather short proboscis. Ovigera well developed in both sexes, 10-jointed, sometimes 8-jointed, with the end widened and with spines in most cases. Body usually elongate, segmented with suture lines showing. The 1st or ocular segment is usually broadened at its cephalic end. The neck extends in front of the 1st pair of legs.

Genus NYMPHON Fabricius, 1794

Body smooth, more or less slender, cylindrical, with well-defined lateral processes. Cephalic segment large, with marked neck and an expanded forward part. Caudal segment small, cylindrical. Eye tubercle more or less elevated, eyes usually equal, at the base of the proboscis. Proboscis rather thick, cylindrical, smooth, rounded at its end, not usually long. Chelifori well developed, hand narrow, fingers usually shorter than the palm and finely dentate on the inner margins. Palpi moderate length, 1st joint small. Terminal joints shorter than the 2nd or 3rd, often quite

hairy. Ovigera 10-jointed, few hairs. Fourth and 5th joints in the male very long and slender. The last 4 joints have a regular series of serrate spines. The terminal claw is well developed. Ambulatory legs as a rule very long and slender, few hairs. Second tibia the longest joint, tarsal joints more or less elongate. Terminal joint usually with distinct auxiliary claws. Egg masses in the male globular, small, usually one bunch to an oviger.

Nymphon pixellae Scott

Plate 35

Nymphon pixellae Scott, Ann. Mag. Nat. Hist., Ser. 8, vol. 10, 1912, pp. 207-208, pl. 7.

Nymphon solitarium Exline, Proc. U.S. Nat. Mus., vol. 83, no. 2991, 1936.

Nymphon pixellae Hedgpeth, Ann. Midland Naturalist, vol. 22, no. 2, 1939, pp. 458-459.

Distinctive features: Body rather slender, elongate, lateral processes rather long. First joint of the chelifori quite a little longer than the proboscis. Jaw portion of the chelifori long, with the tips crossing. Many slender teeth on the jaws. Paired tarsal claws are about half as long as the unpaired. Eye tubercle sharply pointed. First joint of the tarsus longer than the 2nd.

Description

Body: Slender, elongate, segmentation marked, lateral processes well separated. Trunk segments nearly equal in thickness except the posterior, which is a little more slender. Segments of the body about the same length, a little thicker where the lateral processes join. The anterior segment forms a well-marked neck.

Ocular region: The eye tubercle is just forward of the origin of the 1st pair of walking legs, between the bases of the ovigera. The eye elevation is well marked and abruptly pointed at its end. The eyes are at the basal end of the ocular elevation. They are large and almost touch. They are also quite well pigmented.

Abdominal segment: Cylindrical, pointed up, rather small.

Chelifori: First joint rather slender, quite long. The 2nd segment is shorter and a little heavier. The fingers are long, slender, with many teeth. The fixed finger is nearly straight to near its tip, which is strongly curved.

Palpi: Slender, the 1st joint is very small, the 2nd is longer, the last 3 joints are shorter than the 2nd and about of equal length.

Oviger: Ten-jointed, the 1st short, 2nd and 3rd about equal and a little longer than the 1st. The 4th is about twice as long as the first 3. The 5th is more slender and longer than the 4th and is swollen at the distal end. The 6th is shorter, with many small hairs on its ventral side. The 7th is shorter than the 6th, with an even row of about 13 elongate spines on its ventral side. Each spine has lateral extensions. The 8th joint is shorter than the 7th. The 9th and 10th are about equal to the 7th in length and are similarly armed with spines. The 10th segment bears a long terminal claw with teeth on its lower margin.

Ambulatory legs: Not very hairy, about 37 mm. long; the 1st coxa is the shortest of the three, and the 2nd is the longest. The femur is quite long and is curved ventrally. The 1st tibia is a little longer and the 2nd tibia is the longest leg joint. The 1st tarsus is longer than the 2nd. The terminal leg claw is well developed, and the paired claws are about $\frac{1}{2}$ as long.

Measurements: The proboscis is about 2 mm., with the neck region about 1.7 mm. The 1st body segment is slightly longer than the 2nd. The lateral processes are a little longer than the abdominal appendage.

Comparisons: This species resembles *N. meridionale* and *N. hiemale*, but the 1st segment of the cheliforus is shorter than the proboscis.

Material studied

One specimen, Station 575-36, north of San Pedro Nolasco Island, Gulf of California, March 12, 1936, 100 fms.

One young specimen, Station 719-37, Lower California, Consag Rock, March 24, 1937, 10-25 fms.

One male, No. 3856, Redondo Beach, California. Collected by Burch.

One female, Station 1185-40, southern California coast, September 28, 1940, 50 fms.

Two females, 1 male with eggs, Station 909-39, Catalina Island, Emerald Bay, 2 miles off shore, Jan. 28, 1939, 65-90 fms.

One female and 1 young, Station 1181-40, southern California coast, Sept. 10, 1940, 47 fms.

One female, Station 978-39, Santa Barbara Island, east of Gull Island, May 28, 1939, 21-28 fms.

In addition, I have abundant material from about 2 dozen localities off the west coast of North America. These and other records at my disposal give this range from the Canadian border down to Lower California. This species is a very common one in waters of moderate depth. Most of the records are of specimens not many miles off shore.

Family **Callipallenidae** (Hoek), 1876

Chelifori well developed, palpi lacking in most, ovigera in both sexes. The chelifori are 2- or 3-jointed with very large chelae, which extend over the mouth. In a few there are palpi 1- to 4-jointed. The ovigers are 10-jointed and are well developed in both sexes. They are usually coiled at the free ends and are supplied with marked compound spines. The body is elongate and segmented. The eye segment is on the neck in front of the base of the 1st pair of walking legs. The proboscis is rather short and cylindrical. There are 4 pairs of walking legs. The sex openings in the male are in the 3rd and 4th pairs or in all the legs. In the female the sex openings are in all the legs.

Callipallene californiensis (Hall), 1913

Plate 36

Pallene californiensis Hall, Univ. Calif. Pub. Zool., vol. 11, no. 6, 1913, pp. 131-134, pl. 4.—Hilton, Jour. Ent. and Zool., vol. 8, no. 3, 1915, p. 67; 1920; vol. 31, no. 2, 1939, p. 92.

Characteristics: Slender body, ocular segment rather compact, short neck. First segment of the body not quite so long as the rest of the body and the 1st coxal segment of the last pair of legs. Three strong spines on the 2nd tarsal joint below. The 1st and last of these may be paired. Fifth joint of the oviger with a marked projection. Third and 4th body segmentation lines not distinct.

Description

Body: Short, stout, smooth surface. Anterior corners of 1st body segment rounded with quite a constriction of this part laterally, halfway between the posterior border of the segment and the base of the chelifori. Lateral processes with bases contiguous. A furrow in the body makes it appear that there are precoxal joints to the legs. Segmentation distinct between 1st and 2nd and 2nd and 3rd body segments. Third and 4th body segments united, but with a line or furrow in the integument across the body anterior to the insertion of the caudal segment and shows trace of obsolete segmentation between these segments.

Ocular tubercle: Low, situated above and between the lateral processes of 1st legs, and distinct, about its own diameter from the posterior body segment.

Proboscis: Very short and blunt, length $\frac{3}{4}$ its diameter. Anterior corners rounded.

Palpi: Wanting.

Oviger: Ten-jointed, 4 terminal joints spirally rolled with a row of flat denticulate spines on the inside of the last joints. No terminal claw. First 3 joints short, 4th about as long as the first 3 together. Fifth longest, with a projection on the distal end directed opposite to spiral terminal joints. Two simple curved hairs, one at the tip of the elevation, the other distally placed. Terminal 5 joints short, nearly equal in length, becoming a little thinner toward the end. Eggs 0.2 mm. in diameter.

Ambulatory legs: Slender, no evident knobs or spines. First coxa about as long as its diameter. Second coxa about 3 times the length of 1st coxa. Femur about equal in length to combined lengths of the coxal segments or joints. First tibial joint not quite so long as the femur, 2nd tibial joint about as long as the femur but of less diameter. Scattered hairs on the tibial joints. Tarsus a little less than half as long as the length of 2nd tibial joint. Terminal claws a little over half the length of the tarsus. Auxiliary claws $\frac{2}{3}$ as long as the terminal claws. Several simple hairs on the distal end of the tarsus. Spines on the male very stout, especially near the head. A light fringe of hairs is usually present at the distal end of each joint in all the legs.

Measurements of the type by Hall: Length, 1.25; proboscis, 0.27; body, 0.93; caudal segment, 0.15; 3rd leg, 4.05.

General form of the body somewhat like *P. laevis* Hoek, but the proboscis is not jointed, and the oviger does not end in a claw in this species. The proboscis is more like that of *P. empusa* Wilson, but the general shape of the 1st body segment is different, being stouter than in this last species.

Material: I have found this species under stones at low tide at Laguna Beach usually associated with delicate bryozoans and hydroids. A few specimens found almost every year for the last 25 years.

One female from under a stone between tide marks.

One female, Station 1184-40, Indian Rock, Catalina Island, Sept. 11, 1940, 62 fms.

Color: Light, almost colorless. Body and legs smooth.

Family Phoxichilidiidae Sars, 1891

Chelifori long, 2-jointed, provided with jaws which lie over the mouth. The palpi are lacking. The ovigers are developed only in the male or are vestigial in the female, without a coil at the end and without

strong spines. The body is elongate and segmented. The eye segment is formed on the base of the proboscis in a little elevation. There are 4 pairs of ambulatory legs. The sex openings in the male and female are in all 4 leg pairs except in *Halosoma*, where they are in the last 2 pairs.

ANOPLODACTYLUS Wilson, 1878
(**PHOXICHILIDIUM** in part)

Trunk rather slender, with the 1st segment constricted anteriorly and extending forward some distance beyond the base of the proboscis, forming a narrow neck. Lateral processes comparatively long and well separated. Proboscis projecting obliquely downward from the ventral side of the 1st trunk segment. Eye tubercle at the extreme forward end of the segment. Chelifori rather small, chelate. Ovigera slender, 6-jointed, terminal joints small. Egg masses several, globular, 1 or 2, loose, and more or less irregular in shape. Legs slender, long. First tarsal joint very short. Ventral margin of the 2nd tarsal joint projection at the base or heel armed with strong spines. Auxiliary claws minute. Its long projecting neck, weaker chelifori, and 6-jointed ovigera with very small terminal parts help to distinguish this genus from *Phoxichilidium*.

Anoplodactylus erectus Cole, 1904

Plate 37

Anoplodactylus erectus Cole, Harriman Alaska Exp., N.Y., 1904, 8°, vol. 10.—Hilton, Jour. Ent. and Zool., vol. 8, no. 3, 1915; vol. 8, 1916; vol. 12, no. 4, 1920, p. 72; vol. 31, no. 2, 1939, p. 92; vol. 31, no. 4, 1939, p. 29.

Characteristics: Body and legs slender. Lateral processes well separated. Eye tubercle conical, eyes near its top. Abdominal segment cylindrical, pointed sharply upward. Second tarsus slender, about equal to 2nd coxal joint. Not strongly curved, 2 larger and sometimes 1 smaller sharp spine at the base of the 2nd tarsus below. Terminal claw long, slender; lateral claws small, slender. Toward the base of the 2nd tarsus below is a knifelike edge.

Description

Body: Lateral processes long, well separated, larger distally, where each has a small conical projection on the dorsal side pointed somewhat outward. First trunk segment larger than the following two together, constricted in its anterior half and produced into a narrow neck.

Eye tubercle: At the extreme forward end of the 1st trunk segment and projecting upward and a little forward, about as long as the 2nd trunk segment and cylindrical. From the side it is seen to be blunt ended. Eyes nearer the top than the base.

Proboscis: About as long as the 1st trunk segment. Cylindrical.

Caudal segment: Moderately long, projecting upward at a sharp angle. More or less cylindrical, tapering to a point, often bulging in the center, notched at the tip. May have 1 to 3 hairs on its sides.

Chelifori: These extend forward from the extreme front end of the 1st trunk segment. About equal to the 1st segment of the body in length. First joint slender, almost cylindrical, just slightly enlarged at the distal end. Smooth but for a few hairs. Chela long just over the front and bent nearly at right angles with the 1st joint and not half so long, with a few hairs. Fingers slender, curved, sharply pointed, about as long as the palm. Movable finger longer than the other and more strongly curved.

Oviger: As long as the animal or longer, slender. First joint short, comparatively thick, 2nd joint twice as long, more slender; these 2 joints extend downward. The 3rd joint bends backward to run nearly parallel with the trunk. It is half again as long as the first 2 joints together and is more slender than the 1st; slightly curved, with the convexity upward. About $\frac{1}{4}$ its length from the basal end is a constriction which looks a little like an articulation. Fourth joint is somewhat shorter than the 2nd, slightly curved. Fifth joint shorter, bent back sharply on the 4th; 6th joint very small oval. The 5th and 6th together scarcely equal the 4th. The 3rd, 5th, and 6th have a few short stiff hairs; some on 6th are directed backward. Eggs in several globular masses.

Ambulatory legs: Slender, 2nd pair $2\frac{1}{2}$ times the total length of the animal. First coxa short, a little longer than broad. Second coxa over twice the size of 1st; at about the center of its dorsal side is a small rounded elevation. In the male the ventral side extends at the distal end into quite a projection with several small bristles, and at the end of this is the genital opening. The female does not have the projection; its distal end is swollen, and the genital opening is situated on a slight elevation a little back from the tip. Third coxal joint longer than the 1st, and it becomes larger as it joins the next division. Femur nearly as long as the whole coxal region, often larger in the female. It is produced dorsally at the distal end into a rounded projection with a long slender hair. In the male there is also a process on the femur just beyond the middle on the

dorsal side, and it is continued out into a narrow tube which projects distally as the end of the opening of the agglutinative gland whose secretion is supposed to fasten the eggs together. The 2nd tibia is slightly longer than the 1st, and both are shorter than the femur. At the distal end of the tibia there is a projection similar to the one on the femur but smaller, but also with a hair. About $\frac{1}{4}$ of the distance from the distal end of the 2nd tibia on the dorsal side is a slight elevation which has a long hair projecting from it. The 1st tarsal joint is very small, roughly triangular, with a broad ventral base with a few moderately strong hairs and a dorsal knob. Tarsus 2 is rather slender, about equal to coxa 2. It is not strongly curved but appears arched on the ventral side because it is much expanded at the base, where it has 2 stout, distally curved spines and a few smaller hairs. The proximal half of the remainder of the ventral margin or the sole is armed with 2 stout, distally curved spines and some smaller hairs. The proximal half of the rest of the ventral margin is armed with a series of close-set distal curved spines varying from 7 to 11. Along the distal part is a thin lamellar knifelike chitinous plate along the sides of which are a very few bristles.

The claw is long, curved, reaching as far back as the heel. Its inner edge is thin, knifelike. Auxiliary claws are very small but distinct with the sole with about 6 spines and a row of 6 or more before the knifelike plate. The legs have few hairs.

Color: Pale, little color in legs or body.

Cole's specimens were as follows: 6 males, 1 female, collected by Professor Kelsey, Sept., 1896, San Diego, California; 1 female, July 8, 1895, collected at San Diego by Dr. S. J. Holmes.

This species is similar to *A. petiolatus* Kröger. In *petiolatus* the trunk is stouter, lateral processes are not so much separated, the caudal segment is long and cylindrical, abruptly acuminate, and placed horizontally. The proboscis is of simple cylindric form. The immovable finger of the chela is nearly straight. The ovigera are as long as the animal. The legs are shorter, being not more than twice the length of the animal. The 2nd tarsal joint is more strongly curved with 4 to 6 spines on the proximal part of the sole. First, there are 2 large medial spines; then, 2 pairs of smaller ones.

This species I have found in great abundance associated with *Tubularia croecia* and *Coryomorpha*. In the former case the complete life history was found associated with these hydroids. Very early stages, shortly after leaving the male, migrate to the coelenteric cavity; later, after sev-

eral stages, they make their way to the outside, where they may be found with those with 3 pairs of ambulatory legs, up to the adults that were sexually mature. At various times immature forms and adults were found on *Coryomorpha*, but I have not as yet direct evidence of their living on these palm hydroids in the youngest stages as they were in *Tubularia*.

This species has been found during a number of years at Balboa, California. Hundreds of specimens have been obtained from Newport to San Diego, California.

The total body length of an average specimen was 2.5; total leg length, 7; spread, 15.

One young specimen, Station 532-36, San Francisquito Bay, Lower California, March 2, 1936, 20 fms.

Also 1 specimen, Station 1162-40, off Seal Beach, July 23, 1940, 95 fms.

One specimen, Station 978-39, Santa Barbara Island, east of Gull Island, May 28, 1939, 21-28 fms.

Anoplodactylus californicus Hall, 1912

Plate 38

Anoplodactylus californicus Hall, First Ann. Rep. Laguna Beach, 1912; Marine Lab. 8, 1912, pp. 91-92; Univ. Calif. Pub. Zool. 8, vol. 11, no. 6, 1913, p. 192, pl. 4.—Hilton, Jour. Ent. and Zool., vol. 8, no. 3, 1915, p. 67; vol. 12, no. 4, 1920, p. 92; vol. 31, no. 2, 1939, p. 29.

Diagnosis: Body and legs rather heavy skin, pitted. Transverse processes separate, but not widely separated, almost touching. Second coxal joint larger at its distal end, with a marked projection on one side. Second tarsal joint heavy, arched, bearing 2 prominent teeth at its base.

Description

Body: Rather short; lateral processes about as long as their own diameter, with bases contiguous. First 2 intersegmental lines hardly evident. The 2 forward processes point forward slightly. The 2 caudal processes point more decidedly backward.

Eye tubercles: A large conical projection arises from the anterior edge of the body and projects over the proboscis. The eyes are not very evident. Deeply pitted skin.

Proboscis: Cylindrical, with end rounded. Almost as long as the body. Diameter $\frac{1}{2}$ its length.

Abdominal segment: About the same size as the eye tubercle but more regular. Deeply and closely pitted.

Chelifori: Large, quite well-developed chelae. The whole appendage extends about $\frac{1}{2}$ their length beyond the proboscis. A few short spines arise on the chelae. Legs rather long, stout, with very few hairs. First coxa shorter than its diameter, 2nd over twice the length of the 1st and enlarged at its distal end. Third coxa $1\frac{1}{2}$ times the length of the 1st. Femur longer than the coxae together. Tibial joints about $\frac{3}{4}$ the length of the femur. Tarsus about $\frac{1}{2}$ the length of the tibial joints. Claw $\frac{2}{3}$ the length of the tarsus, auxiliary claws very small.

Measurements of the type were: Proboscis, 1.42; body from proboscis to abdomen, 1.5; leg, 8; lateral processes of the body, 0.428 diameter.

Hall's specimen was taken from *Fucus* at low tide. It was observed feeding on a nudibranch.

This species resembles *A. erectus* Cole. In 1913 Hall gave notes on this species. In 1912 a number were collected at the bases of *Phylospadix* at low tide, several specimens of both sexes being obtained. The male was found to be $\frac{1}{5}$ smaller than the female, with 6-jointed ovigers, the last 3 segments of which were spirally coiled and closely set with spines, mostly directed proximally. There were several groups of eggs. Chelae of both sexes were often bent in front of the proboscis. The eye tubercle and abdomen project from the body at about the same angle, but not quite perpendicularly. The protuberance on the distoinferior aspect of the 2nd coxal joint is about twice as long in the male as in the female. Openings of the cement gland of the male were on the superior aspect of the femur about halfway down on legs 2, 3, and 4.

Measurements: Length, female type, 3; male, 3.6; maximum, 3.8. Proboscis, female type, 1.5; male, 1.5; maximum, 1.6. Body, female type, 1.5; male, 1.8; maximum, 2.1. Span of 2nd process, female type, 1.5; male, 1.8; maximum, 2.1. Caudal segment, female type, 0.6; male, 0.53; maximum, 0.65. Third leg, female type, 8.5; male, 9; maximum, 10.2.

Color: Dark straw.

This species is very close to *A. erectus* Cole. The chief differences are as follows: The lateral processes are not so widely separated and in some specimens may even touch at their bases. This, however, I consider of minor importance because the condition of the body, perhaps individual variation, makes a difference here. The tarsus is different in the two, being more robust in both claw and 2nd tarsal joint in this species than in *A. erectus*.

Several specimens from Laguna Beach agree in most respects with Hall's descriptions. However, I am inclined to the opinion that this and the next described species *may* be the same. The chief difference between them seems to be the position of the lateral processes, which are closer together in this species.

One specimen, Station 1184-40, Indian Rock off Catalina Island, Sept. 11, 1940, 46 fms.

Anoplodactylus robustus Hilton, 1939

Plate 39

Anoplodactylus robustus Hilton, Jour. Ent. and Zool., vol. 21, 1939, p. 28.

Characteristics: Body heavy. Legs rather long, heavy. Second tarsus with 3 long spines in its basal region and many smaller ones farther along. Median tarsal claw long, moderately slender, with a narrow free edge below. Paired tarsal claws slender, small. Body heavily chitinated, moderately pitted. Attachment discs on the under sides of the base of the proboscis.

Description

Color: Dark brown, red brown, or often greenish; after preservation the color may be pink or red.

Body: Rather robust, elongate. Segments marked by prominent suture lines. Lateral processes about as broad as the ventral part of the body, each with a slight knob on its distal dorsal border. The 1st process is directed forward; the 2nd, straight out; the 3rd and 4th directed backward. The last 2 are contiguous at their base. The 1st or ocular segment roughly pointed in front, with the neck bearing the eye tubercle continued forward over the base of the proboscis. Just above, where the ovigers come off, are 2 little processes slightly in front of the 1st lateral process. There are 3 suture lines across the body: the 1st just back of the 1st pair of lateral processes, the 2nd just back of the 2nd pair of lateral processes, and the 3rd back of the 3rd pair of legs.

Ocular elevation: Quite high and situated on the short neck, from which the chelifori take origin. It is pointed straight up and runs to a sharp tip. At its base are 4 well-developed eyes, quite deeply pigmented.

Proboscis: Irregularly cylindrical, swollen slightly at the center and at the ends. Shorter than the body.

Abdominal segment: This is rather slender and quite long. It points straight up and is slightly smaller at its tip.

Chelifori: Strongly developed and close together as they come off from the narrowed end of the 1st body segment. The 1st joint is cylindrical and about half as thick as a leg. It is somewhat bent toward the end and projects beyond the end of the proboscis. The 2nd just meets the 1st at an angle. The chelae are rather showy, the fingers shorter than the palm. The movable finger is on the outside. There are a number of short hairs on the chelae.

Ovigers: Well developed in the male (Type). Often indicated in the female by a short single joint. Six-jointed, the 1st joint rather long, thick; 2nd longer, but less thick; 3rd like the 2nd, but longer; 4th shorter, about $\frac{1}{2}$ as long as the last, bent at the ends into a slight bow; 5th about the size of the last, bent and nearly parallel with the last; 6th small, a mere knob. The last 3 joints have delicate hairs, especially on their inner sides.

Ambulatory legs: Long, rather heavy, 1st joint a little longer than broad and broader than the next joint, especially its base. Provided with 2 slender lateral distal spines. Second coxal joint about twice as long as the last but more slender. It bears a few lateral hairs, and on all legs it bears a prominent distoventral projection. This is especially large on the first 2 pairs of legs but is evident on the others. These spurlike extensions have short hairs on them. The 3rd coxal joint is a little longer than the 1st but more slender. It bears a few sharp hairs on its distoventral border. The femur is about the diameter of the 3rd coxal joint at its base but becomes larger farther on. It is longer than the whole coxal region. It bears a few hairs and a sharp knob on the dorsal distal surface. The 1st tibial joint is nearly as long as the femur, narrow at its base, but extending distally with a few hairs on the shaft and a group around the distal end. Second tibia is longer than the last but more slender. It has a few prominent hairs on the shaft above and a few at the distal margin. The 1st tarsus is comparatively large, almost cylindrical, with very little of its edge free above, but a long line below ending in a forward extension armed with a group of rather long, strong hairs directed forward. It has fewer hairs on its more ventral portion, but the forward end is especially well provided with hairs. This part articulates with the 2nd tarsus at an angle, with a marked projection of the basal part of the 2nd tarsus, into a prominent lobe. This lobe is armed with 2 heavy spines at its base and a double row forward of 4 or 5 more in each row nearly as large as the basal hairs. The more forward part of the joint has 2 rows of much smaller hairs on its rather straight ventral edge. The terminal claw is

long, rather slender, with a thin inner edge. It is a little ventral to the end of the joint and is about half the length of the joint. There are a few small hairs about its base above. There is a very small auxiliary claw on each side of the large terminal one.

The description given above is that of a male specimen. The female is similar, but there are a few points of difference. They do not differ much in size, but the projection on the 2nd tarsal joint is less prominent in the female. The female also is nearly lacking in ovigers, but they are represented by a small unjointed knob at the base of the proboscis below. Also on the base of the proboscis of the female are 2 swollen elongate areas provided with chitinous thickenings. These are elongate and close together. They seem to be some sort of attachment organ, and are not present in the male.

Color: Dark brown, red brown, or often greenish; after preservation the color may be pink or red.

Measurements of the male type: Length of body, 3; proboscis, 2.5; lateral processes, 1; total breadth of body, 2.75. First joint of chelifori, 1.1; 2nd joint, 0.4. Oviger, 1st joint, 0.07 by 0.03; 2nd joint, 0.075 by 0.02; 3rd joint, 1 by 0.02; 4th joint, 0.05 by 0.01; 5th joint, 0.03 by 0.01; 6th joint, 0.01 by 0.01. Spread, 24.5. Abdomen, 0.75 by 0.04. Eye tubercle, 0.5 by 0.6 at the base. Length of leg joints, 1st, 0.45; 2nd, 1.2; (projection in female, on the last legs, 0.5;) 3rd, 0.95; 4th, 2.2; 5th, 2; 6th, 2.2; 7th, 0.25; 8th, 1; large claw, 0.85. The small one is very small, not more than 0.01 long.

This species differs from *A. californicus* in being heavier, with its lateral processes more widely separated. It has much more marked extensions on the 2nd coxal joints, and the 1st coxal joint is different in shape. It has attachment discs and vestigial ovigers in the female. It differs from *A. erectus* in being heavier bodied. Its 2nd tarsals are heavier in this species. The color of the body also differs. In *A. erectus* it is pale, often light, almost colorless. In *A. californicus* the color is a deep brown, often red brown to greenish. In preservative it may retain a red-brown or sometimes a greenish color for some time. This species is also heavier than *A. erectus*. I have found it in a number of places along the southern California coast, including the Isthmus at Catalina Island, where it was associated with *L. marginatus* in *Fucus*. It is also occasionally hid in the roots of eel grass and in the holdfasts of kelp from deep water. Some specimens were well pitted, dark in color, and some from deep water were overgrown with bryozoans or hydroids. Well-developed eyes were found

in some deep-sea specimens, and the females or young sometimes had stubs of chelifori and attachment discs on the lower side of the base of the proboscis.

Material: Three specimens of this species, 1 male, 2 females, are from Station 719-37, Consag Rock, Lower California, Mexico, March 24, 1937, on or associated with a basket-star, at a depth of 10 to 25 fms. One specimen, Laguna Beach, 1939.

Family **Tanystylidae** Schimkewitsch, 1913

Chelifori, rudimentary or lacking. Palpi sometimes longer, sometimes shorter than the proboscis, 4 to 7 joints. Ovigera developed in both sexes. Sometimes curved at the ends, the terminal joints with or without spines irregularly arranged. The body is concentrated and the segments fused with each other. Four pairs of ambulatory legs. Sex openings in various genera in various positions: in the male, in the 2nd, 3rd, and 4th leg pairs in *Tanystylum* and *Austroraptus*; in the 3rd and 4th leg pairs in *Discoarachne* and *Trigaelus*; and in the 4th pair in *Rhynchothorax*. In the female the openings are in all leg pairs except in *Tanystylum*, in which they are in the 3rd and 4th pairs, and in *Rhynchothorax*, in which they are in the 4th pair.

Genus **TANYSTYLUM** Miers, 1879

Trunk broad, with short lateral processes not widely separated from each other. Body not segmented, disc shaped. Chelifori lacking or represented by a small 1- to 2-jointed appendage, which may bear jaws in immature specimens. Palpi 6- to 7-jointed. First and 3rd joints short, 2nd and 4th longer. Femoral joints of female often enlarged.

***Tanystylum californicum* Hilton, 1939**

Plate 40

Tanystylum californicum Hilton, Jour. Ent. and Zool., vol. 31, 1939, p. 32.

Diagnosis: Body as a whole circular in outline. Skin pitted, dark, strongly chitinized. Lateral processes separated by narrow intervals. Lateral processes with 2 moundlike elevations on their free margins on the dorsal side. Second tarsal joint with 3 strong teeth on the rather definite heel. Lateral claws less than $\frac{1}{3}$ the length of the long claws.

Description

Color: Light straw with a deeper color where the chitin is thicker, especially between the lateral processes of the body. Skin pitted.

Body: Broad, no segmentation. The lateral processes separated from each other by narrow intervals which penetrate well toward the center of the central disc of the body. The lateral processes are provided with 2 moundlike elevations at their free margins on the dorsal side. The body as a whole is of a nearly circular outline, truncate in front. The ocular region of the 1st body segment presents a straight line at its cephalic margin, and the elevation including the ocular eminence is in the form of a rounded triangle. This triangle is slightly higher than the surrounding body parts. The ocular elevation is in the center of the broadest side of the triangle, which is the front margin. The lateral margins of this whole elevation are bent in on each side, giving the triangular elevation a 3-pointed area whose front margin is straight and whose lateral margins are curved in.

Eye tubercle: This is a sharply pointed elevation in the center of the front margin of the triangular elevation mentioned above. The 4 eyes are along the sides of this projection and are but slightly pigmented, although well formed and about of equal size.

Proboscis: Broad at the base and then tapers quickly to less than half the breadth of the base and ends in a rather small tip. It is shorter than the palpi. There is a slight suggestion of constriction about $\frac{2}{3}$ of its distance from the base. The tip of proboscis including its last $\frac{1}{3}$ bends sharply downward.

Caudal segment: Cylindrical, about as long as the lateral processes and bears several short hairs.

Chelifori: Single-jointed, slightly longer than the 1st palpal joint, and a little less than half as wide as the 1st palpal joint. They are just within the palpi in position, and each is provided with 3 or 4 short stout spines near its tip.

Palpi: These seem to be 5-jointed. The 1st joint is short, the 2nd about twice as long. The 3rd is the longest joint and gives some indication of fusion of 2 parts. The 4th joint is short, with a blunt free projection at its inner end distally. The last, or 5th, joint is longer than the 4th but more slender. There are very few hairs on the 1st joint. The 2nd has a lateral hair which is quite prominent. The 3rd joint near its base has several prominent hairs, especially a rather long slender median one. Toward the tip of this joint are a few more moderately prominent hairs.

The next to the last, or 4th, joint bears several strong hairs on its free blunt appendage. The last joint has a fringe of short stout hairs on its inner margins and slightly stronger ones, about 4 in number, at its distal margin. There is a decided bend in the palpi at the 4th joint. The palpi as a whole slope downward, but the bend at the 4th joint prevents them from extending below the tip of the proboscis.

Ovigers: These are apparently 10-jointed in the male type. The last 4 joints are small, and the last 3 are bent back upon the others. The last joint is small, armed with 3 long spines. The next 2 are not clearly marked; each has 2 short spines. The 4th from the last bears a thick projection almost at right angles to the rest of the segment. This appendage or joint bears several strong hairs. The next joint above is about equal to this in size but bears fewer hairs. Of the other joints, the 1st is short and broad, the 2nd is about the same length but not so broad by half, the 3rd and 4th are about equal, the 5th a little longer than the 4th and bent almost at right angles to it. There are many specimens which have no ovigers, yet seem to be adult. Some, at least, seem to be adult females.

Color: Light straw, with deeper red-brown where the chitin is thicker.

Ambulatory legs: The legs seem about equal in length. The 1st coxal joint bears 3 distal projections on its dorsal side. The cephalic joint is the largest and bears about 4 short, sharp hairs. The middle one, which is not quite in the center, is next in size, is conical, and bears a hair at its tip. The most rounded is the smallest, and it bears 2 short hairs. The 2nd joint is about as long as the last but bears no fleshy appendages. There are, however, a number of short, straight hairs along its distal and caudal margin. The 3rd joint is a little narrower and a little longer than the last, with a few lateral hairs in the central part of the caudal margin. The 4th joint is about twice the length of the last, with 2 small groups of small hairs on its cephalic margin and other groups dorsally and caudally disposed. The 5th joint is about like the last, with about 3 rows of hairs on the dorsal surface. The 6th joint is similar with scattered short spines above. The 7th joint or heel is short, with many slender hairs on its lower surface and one large tooth. The last joint is gently curved, bearing a large terminal claw and 2 smaller claws which are less than a third the length of the large claw. The upper side is quite convex and rather free from hairs; the lower side has 3 strong teeth near the heel and a number of more delicate hairs along the whole concave margin. The terminal claw is less than half the length of the terminal joint.

Measurements: Length of body, 0.85 by 0.8 across. The lateral processes each are 0.25 deep; the body between is 0.3 across. The proboscis is 0.55 long by 0.3 at the base, and 0.005 at its tip. The ocular tubercle is 0.15 at its base and 0.2 high. The abdomen is 0.3 long by 0.175 broad. The chelifori are 0.05 long. The palpi have the joints as follows: 1st, 0.075 by 0.1 wide; 2nd, 0.2 long; 3rd, 0.375 long; 4th, 0.2 long; 5th, 0.2.

Type U.S. National Museum, No. 110391.

Specimens collected from Monterey to southern California. Two specimens, Station 1184-40, Indian Rock, Catalina Island, Sept. 11, 1940, in sea weed, 1 fm.

Family *Ammotheidae* Dohrn, 1881

First appendage well developed, longer or shorter than the proboscis, 2- to 3-jointed. Often small, but usually well developed. It sometimes bears jaws in the young, and in one genus, *Ascorhynchus*, the jaws persist during the life of the individual. Second appendage, often longer than the snout, 6- to 10-jointed, but in most 2- to 4-jointed.

Third appendage occurs in both sexes, 10-jointed; sometimes coiled at the end, sometimes not; sometimes with spines, sometimes not. Sometimes these spines are toothed along the edges, sometimes not. The body is more or less elongate to concentrated, but segmented. There are 4 pairs of legs. The sex openings are in the 3rd and 4th pairs in the male and in all legs in the female.

Genus *AMMOTHEA* Leach, 1914

Genus *ACHELIA* Hodge, 1864

Trunk, short, stout, segmentation usually lacking. Lateral processes so crowded that the body is disciform. The 1st segment is large, with a square frontal portion. Caudal segment not separated from trunk by a suture, narrow, nearly cylindrical, horizontal. The eye tubercle is near the front of the 1st segment, projects strongly, and bears distinct eyes. It is constricted at its base, fusiform with a circular constriction near its end, and pointed downward. Chelifori well developed, small, 2-jointed, the 2nd joint globose, chelate in the immature. Palpi 8-jointed, first 3 joints short, 4th longer. Ovigera relatively short, larger in the male,

without terminal claw, but with a few delicate spines and some stronger ones on the inner margins. Female genital openings on the 2nd coxal joints of all legs.

Ammothea latifrons Cole, 1904

Plate 41

Ammothea latifrons Cole, Harriman Alaska Exp. N.Y., 8°, vol. 10, 1904, p. 263, pl. 11, fig. 3, pl. 16, figs. 1-9, pl. 17, figs. 1-3.

Characteristics: Broad trunk, with erect conical elevation with few spines at each corner. Suture lines faintly marked in front, lacking behind. Eye tubercle high, erect, bluntly conical. Caudal segment long and narrow. Chelifori much more than half the length of the proboscis. It bears marked tubercles and spines. Palpi 8-jointed, reach to well beyond the proboscis. Second coxa not much longer than 1st; 1st and 3rd, marked tubercles on the distal ends.

Description

Body: Trunk broad, especially anteriorly, each outer corner having an erect conical elevation bearing a few spines. Suture lines faintly marked in front, lacking behind. Lateral processes crowded, about twice as long as broad distally. On the dorsal border of these distal ends 3 nodules with 1 or more spines each.

Eye tubercle: On the extreme anterior edge of the 1st trunk segment, moderately high, cylindrical; the apex bluntly conical, eyes quite large, near the apex.

Proboscis: About as long as the trunk to base of caudal segment, broadly elliptical, truncated at the end. Dorsal border more convex than ventral, no circular constriction but longitudinal lines.

Caudal segment: Very long and narrow, as long as the proboscis. It reaches a little beyond the middle of the 2nd coxal joint of the posterior pair of legs. Not separated from trunk by a suture. It is directed somewhat downward. Its dorsal outline is irregular and bears a number of stout spines.

Chelifori: Much over half the length of the proboscis and thick. The 1st joint reaches to the middle of the proboscis. It bears tubercles on its dorsal side, and these bear spines. The 2nd joint small, spherical, with 1 or 2 spines. The chelifori are bent outward in the middle.

Palpi: Eight-jointed. Extend beyond the proboscis by about $\frac{1}{3}$ of their length. Joints 2 and 4 are long, joint 2 the longer; the others are short. Basal joints have a few hairs; distal joints, many hairs.

Ovigers: Female, about as long as the palpi; 1st joint short, broad; 2nd comes off from the side of the 1st; 2nd and 3rd about equal and longer than 1st; 4th and 5th about equal and longest of all; 6th to 10th successively smaller; 10th very small and rounded; 7th, 8th, 9th, and 10th, each with 2 denticulate spines; 4th and 5th, few small hairs.

Male oviger nearly twice as long as the oviger of the female. First joint square, 2nd longer, 1st and 2nd broader than the following joints; 3rd longer than 2nd; 4th and 5th about equal, longer than 3rd; 6th to 10th successively smaller, except 9th, which is longer than 8th; 10th small, with 2 denticulate spines; 9th has one spine at least; 4th to 7th armed with short backwardly projecting spines in rows, while the following joints for a few divisions have 2 or 3 small hairs each. The end of the oviger is strongly curved inward. Egg masses rather small, globular, one mass to each oviger.

Ambulatory legs: Rather short. Second coxa not much longer than 1st and 3rd. First coxa has 3 tubercles on its dorsal edge, each with spines. Femur shorter than the coxal region and broad in the female, where it is equal to the width of the proboscis. Projecting distally from the dorso-distal border is a long conical extension bearing a strong spine. Tibial joints 1 and 2 are equal, thick, more or less armed with spines which are longer on the dorsal side. First tarsal joint is small, subtriangular, with short even spines. Tarsus 2 is moderately strong, arched with rows of slender spines dorsally and on the sides, and with 3 strong spines at the heel and a row of very short ones along the sole. The claw is about $\frac{1}{2}$ the length of the 2nd tarsal. The auxiliary claw is well developed and about half as long as the large claw.

In the male the genital projection on the ventrodistal area of the 2nd coxa of the 2 last legs is thumblike and with 1 or 2 slender hairs. In the female the genital openings are on all 4 pairs of legs; length, 4; spread, 16; about the same size for both sexes.

Immature forms, but little smaller than the adults, have chelate chelifori and very short ovigers.

Cole's specimens were 2 males, 3 females, and 2 young from St. Paul's Island, Pribilofs; 1 male, 3 females, 2 young from Dutch Harbor, Unalaska.

This is distinguished from other species by its elliptical proboscis and long knobbed chelifori and caudal segment.

One female, Station 1177-40, north of Santa Barbara Island, Sept. 9, 1940, 37 fms.

***Ammothella bi-ungiculata* (Dohrn), 1881**

Plate 42

Ammothea bi-ungiculata Dohrn, Fauna and Flora Gulf Nap. Monag. III, Leipzig, 1881, 4°, pp. 158-160, Taf. 8.

Ammothella bi-ungiculata var. *californica* Hall, First Ann. Rep. of Laguna Marine Lab., 1912, pp. 93-95.

Ammothella bi-ungiculata Hilton, Jour. Ent. and Zool., vol. 8, no. 3, 1915; vol. 12, no. 4, 1920, p. 92; vol. 31, no. 2, 1939, p. 32.—Ohshima, Rep. de Bul. Sc. de la Fakultato Terkultara, Kjusii Imp. Univ., vol. 2, r5, 1927, pp. 610-612, 1 pl.; Proc. Imp. Ac. III, 1927, no. 9.

Diagnosis: Body and legs rather smooth, 2 tarsal claws. Segmentation of body evident. Eye tubercle rather low, blunt. Long, large proboscis.

Description

Body: Segmented, lateral processes moderately separated, moderate development, their length about half their diameter. Body rounded in front.

Eye tubercle: Low, broad, 4 eyes well pigmented.

Proboscis: Quite broad, smaller at the ends. Its length $2\frac{1}{2}$ times its diameter and $\frac{4}{5}$ the length of the body. It ends in an obtuse rounded angle as seen from above.

Abdominal segment: Small, cylindrical, less than $\frac{1}{4}$ the length of the body, with a bluntly rounded tip. Anus in a notch at the end.

Chelifori: Short, $\frac{1}{6}$ the length of the proboscis, 3-jointed. The 1st joint very short, not quite so long as the 3rd or last joint. Second joint about twice the length of the 1st. Third joint a little larger than the 1st, rounded. The thickness of the appendages a little less than that of the palpi.

Palpi: Nine-jointed, as long as the proboscis. First joint short and thicker than the others. Second joint 4 times as long as the 3rd, 4th almost as long as the 2nd, 5th and 6th about as long as the 3rd. Terminal joints decrease in order. Few hairs on any joints except the last.

Ovigers: Slightly longer and wider than the palpi. In order of length, except the first, which is shorter and thicker, they are 4th, 5th, 6th, 3rd, 7th, 8th, 9th, and 10th. The terminal joints are spirally rolled, and on the tip of the last are 3 stiff plume hairs. There is a similar hair on each side of the 8th joint.

Ambulatory legs: Rather long, stout, no tibial process, few hairs except on the tarsus. First coxal as long as wide, 2nd twice as long, 3rd $1\frac{1}{2}$ times the length of the 1st. Femur about as long as the combined length of the 2nd and 3rd coxals. Second tibial joint about the length of the femur, 1st slightly shorter. Second tarsus less than half as long as the 2nd tibial joint. There is a double row of fine hairs along the sole and a few longer ones on the end. No terminal claw, 2 auxiliaries well developed.

Measurements: Body length, 1.3; proboscis, 1.05; abdomen, 0.36; leg, 4.2; lateral processes, 0.214. Other measurements as given by Hall were as follows: length, female type, 2.85; male, 2.5; maximum, female, 2.85, male, 1.38. Proboscis, female, 1.15; male, 0.9; maximum, male, 0.96. Body, female type, 1.35; male, 1.15. Caudal segment, female type, 0.3; male, 0.24. Transverse process, female type, 0.66; male, 0.75. Third leg, female type, 4.5; male, 3.5.

Color: Light straw.

About 20 specimens were first reported by Hall from under stones, at low tide, Laguna Beach, California, 1912, and over 50 specimens in 1912 from a similar locality. I have found this species every summer for the last 25 years at Laguna Beach or near by. I have found it also at the Isthmus at Catalina Island, under stones, and below Ensenada, Lower California, perhaps several hundred in all. It is usually found under stones at low tide among hydroids, bryozoans, and sponges. Also several from the Hawaiian Islands.

Measurements of a Laguna Beach female specimen: Length of body, 1.4 by 0.625, of which the lateral processes are on each side. Proboscis, 1.2 long by 0.5 across the center, 0.25 across the tip, and 0.35 at the base. Ocular elevation, 0.175 high by 0.028 across. Abdomen, 0.3 long by 0.055 at the base, and 0.12 in the middle. Chelifori, 1st joint, 0.075; 2nd, 0.25; 3rd, 0.3; 4th, 0.2; 5th and 6th, 0.03; and last joint, 0.075. The oviger was 0.1, 1st joint; 0.225, 2nd; 0.1, 3rd; 0.3, next; 0.2, next; 0.150, next; 0.1, next; 0.075, each next; and 0.05, the last. The legs were as follows: 1st, 0.15 long by 0.225; 2nd, same; 3rd, 0.5 by 0.225; 4th, 0.35 by 0.2; next, 0.7 by 0.3; next, 0.875 by 0.14; next, 0.075 by 0.075; last joint, 0.4 by 0.125. The claws were 0.1 by 0.025 at base.

Portuguese Bend, California, March 11, 1938, shore. Tom Burch, collector.

***Ammothella heterosetosa*, new species**

Plate 43

Characteristics: Body moderately heavy for the size. Scattered spines over the body surface. Chelifori nearly as long as the large proboscis. On each of the 2 long joints is a row of long, large, flat hairs; on the surface are small hairs and very small forked spines.

Description

Body: Moderately heavy for the size. Scattered spines or fine hairs over the surface. Lateral processes well developed but shorter than the body between. Suture lines between segments well marked and slightly chitinized.

Ocular segment: Well developed, almost as long as the rest of the body. Ocular tubercle, a rather high mound. The eyes are not well pigmented.

Proboscis: Not quite so long as the body and nearly as wide as the body, oval in outline, narrowed some at the base to the tip.

Abdomen: Moderate length. It reaches just beyond the last pair of transverse processes.

Chelifori: Three-jointed. Nearly as long as the proboscis. The 1st joint is a little shorter than the 2nd. The last is small and conical. The long joints bear on each edge a row of long, large, flat hairs; on the surface are small hairs; and very small forked spines are scattered among the circular spots.

Palpi: Nine-jointed. Basal joints rather heavy; the joints, especially the last, small. A few hairs are found on these, and 2 serrate spines on the 9th.

Ambulatory appendages: Quite heavy, especially the 2 basal coxae. Femur rather short, 2nd tibia longer than the 1st. First tarsus well developed. A spine above and several below. Second tarsus not quite half so long as the 2nd tibia, a little thick. Bears a short, heavy claw and paired claws. Ventrally it bears 4 or more broad teeth near the base and several more slender ones farther on. It also has several long hairs dorsally. The 1st and 2nd coxae bear a number of flat, long hairs laterally. The 3rd has 4. There are some on the long joints, but shorter ones predominate toward the end, especially on the 2nd tibia.

Type, 1 male with eggs, U.S. Nat. Museum no. 306, Marchena Island, Galapagos Islands, shore, reef north end of Island, December 2, 1934, Hancock Expedition. This species is distinguished by the character of the setae on the appendages and body. Many of the largest ones are

broad, flat, and quite long. There are also many spines on all parts; the hairs are large and small, often flattened; and there are also peculiar little 2-branched spines, especially on the chelifori.

The chelifori are broad and covered with an unusually thick lot of flat hairs. The palpi are 9-jointed and long, not very hairy. The segment lines are strongly chitinized. The position of the last transverse processes is rather unusual. The terminal joint of the 3-jointed chelifori is unusual.

Color: Pale straw.

Measurements: Base of chelifori to 1st segment line, 0.4; between segmentation lines, 0.15; from the 3rd line to the end of the last transverse process, 0.25. Proboscis, 0.85 by 0.2 to 0.45. Total length of the body, 1.8; lateral process width, 0.2; body between, 0.4; total body width, 0.8; under level, 0.15 by 0.15. Chelifori, 1st joint, 0.4 by 0.1; 2nd joint, 0.35 by 0.075 to 0.1. Palpi, 1st joint, 0.125 by 0.1; 2nd, 0.2 by 0.875; 3rd, 0.35; 4th, 0.2; 5th, 0.2 by 0.175; 6th, 0.175 by 0.4; 7th, 0.1; 8th, 0.125; 9th, 0.175 by 0.025. Oviger, 1st joint, 0.2 by 0.175; 2nd, 0.25 by 0.1; 3rd, 0.175 by 0.1; 4th, 0.375 by 0.075; 5th, 0.4 by 0.075; 6th, 0.1 by 0.075; 7th, 0.175 by 0.075; 8th, 0.075 by 0.05; 9th, 0.05 by 0.05. Ambulatory appendages, 1st joint, 0.275 by 0.2; 2nd, 0.3 by 0.1 to 0.2; 3rd, 0.3 by 0.2; 4th, 0.5 by 0.2; 5th, 0.65 by 0.1 to 0.2; 6th, 0.65 by 0.175; 7th, 0.075 by 0.075; 8th, 0.2 by 0.1. Spread, 6.6.

Genus **NYMPHOPSIS** Haswell, 1885

"First pair of appendages well developed cheliform. Second pair well developed with 9 joints. Third pair with 7 joints, none provided with compound spines." The above is Haswell's description of the genus. It is quite evidently incomplete and not inclusive enough. The 1st pair of appendages is not always chelate, although the last joint suggests it often. The compound spines of the body and appendages are characteristic, together with the long abdomen with its characteristic spines.

Nymphopsis spinosissima (Hall 1912)

Plate 44

Ammothella spinosissima Hall, First Laguna Report, 1912.—Hilton, Jour. Ent. and Zool., vol. 8, no. 2, 1915, p. 67; vol. 12, no. 4, 1920, p. 92; vol. 31, no. 2, 1939, p. 72; vol. 31, no. 4, 1939, p. 31. —Hedgpeth, Amer. Mid. Nat., vol. 22, no. 2, 1939, pp. 461-463, pl. 2.

Characteristics: Body nearly disclike, 3 strong spines on the middle line of the dorsal side. Segmentation lines not distinct. Chelifori with compound spines. Abdomen with a linear series of compound spines. Three basal teeth on the 2nd tarsus of the legs. Tufts of spines, 2 for each transverse process of the body at their distal margins.

Description

Body: Almost circular in outline. Hall describes the lateral processes grown together throughout their length. I have examined many specimens which agree with Hall's description in every other respect in this well-marked species, but have never found any of the lateral processes really fused. They are often very close to each other and even filled with dirt so as to resemble this condition, but in every case more careful examination revealed a true separation between these processes.

There are no intersegmental lines. Lateral processes are strongly developed, each bearing 1 to 2 tufts of spines. In the center of the back is a row of 3 large erect processes, each bearing numerous spines.

Eye tubercle: Relatively small, length about twice the diameter. Eyes not deeply pigmented.

Proboscis: Shorter than the apparent length of the body but actually longer, because it arises underneath and back. It is bluntly rounded in front, with a notch at the tip. Its diameter is about half its length.

Abdominal segment: About $\frac{3}{4}$ the length of the body. Along the upper side of the abdomen is a row of long projections bearing spines. The diameter of the abdomen is about $\frac{1}{5}$ its length.

Chelifori: Short, slightly longer than the proboscis or reach out beyond it. The appendage has a number of complex spine-bearing processes. The basal segment is about the size of the 3rd terminal segment. The 2nd segment is about $1\frac{1}{2}$ times as long as the other two combined.

Palpi: Nine-jointed, extending beyond the proboscis about $\frac{1}{3}$ their length. First joint is shorter and broader than the others. The 2nd is longest, almost $\frac{1}{3}$ the whole appendage; 3rd, very short; 4th, not quite so long as the 2nd. A ridge across the 4th makes it appear like 2 joints as viewed from above. The terminal joints diminish in length. There are a few hairs on the first 6 joints, but the terminal joints have many. The 2nd joint is thickened at the ends. The average diameter of the appendage is about $\frac{1}{2}$ the chelifori.

Ovigers: Nine-jointed, their diameter between that of the last 2 appendages described. The joints in order of their length are as follows: 4, 2, 5, 3, 6, 7, 8, 9, 1. The terminal joints bear a number of rather long

hairs. The eggs are 0.125 mm. in diameter and 6 or more small bunches on each oviger of the male.

Ambulatory legs: Rather short, strong, with numerous spines on appendages and especially on the coxal and tibial joints. On the 2 tibial joints of each leg these compound spines are arranged in a double row down the upper side of the joint. The 1st and 3rd coxal joints are equal in length, the 2nd about half as long. The femur is as long as the combined lengths of the 3 coxae. The tibial joints are each as long as the femur, but slightly longer than the tarsus. The claw is over $\frac{3}{4}$ the length of the tarsus. There are no auxiliary claws. Length of the proboscis is 1.42; body, 1.2; abdomen, 1.1; leg, 6.35; lateral processes, 0.5.

This species was described from a single specimen obtained from *Fucus* in July, 1911, at Laguna Beach.

Two other specimens were obtained by Hall in 1912, one from *Fucus*, another from under a stone.

I have collected a large number of these from Laguna Beach, but almost always from under stones at low tide. I think their occurrence on brown algae is somewhat accidental. Mostly they are under stones among bryozoans, small sponges, or hydroids and are often covered with debris.

Color: Light brown.

Measurements of a Laguna Beach specimen are as follows: Body length and breadth, 3.5. Proboscis, 1.3 long by 0.55 wide. Chelifori, 1 long. Palpi, 1st joint, 0.15; 2nd, 0.7; 3rd, 0.2; the rest, 0.8 long. Ovigera, last joint, 0.1; next to last, 0.25; next, 0.2; next, 0.3; next, 0.65 by 0.16; next, 1.05 by 0.1; next, 0.85 by 0.1; next near basal, 0.8 by 0.275. Abdominal segment, 1.05 long by 0.2 at base, 0.15 farther along; the spines are from 0.1 to 0.275 to 0.5 in length. The dorsal spines of the body are 0.425 long by 0.15 at base and 0.075 at tip. Spread of legs, 33.5.

I have a large number of this species collected from Laguna Beach during the last 25 years. They were never abundant, but were found every season.

One female, Station 491-36, Rosario Bay, Lower California, Mexico, sand and kelp, February 15, 1936, 10-15 fms.

Specimens also from Santa Cruz Island. Specimens from San Mateo Co. Thurloe Bay, Lower California, Mexico, dredged 30 fms. One young (female?).

One specimen, Station 893-38, off Pt. Arguello, 34° 34' 20" N., 120° 40' 00" W., Aug. 9, 1938, 15-30 fms.

***Nymphopsis duodorsospinosa*, new species**

Plate 45

Characteristics: Body nearly disc shaped in outline, slightly elongate. Two sharp mid-dorsal spines. Leg joints, especially the longer, with compound spines. Abdomen with a few long, mostly simple spines.

Description

Body: Smooth except the hairs or spines at the ends of the processes and the 2 large, prominent vertical dorsal spines which also bear spines on the sides. Transverse processes much longer than the width of the body between. There are no suture lines between body segments. Body a little longer than broad.

Ocular segment: Well developed, broad, but not more than a third the length of the rest of the body.

Ocular tubercle: Cylindrical, high vertical, bears 4 black eyes near tip, placed a little back of the forward end of the body.

Proboscis: Cylindrical, a little narrowed at the base, rather slender, slightly truncate at the end. Three times as long as wide.

Abdominal segment: Long, curved, extends at a slight angle backward. It bears about 4 scattered spines up to its central part and 2 sharp compound spines nearer the end, all on the dorsal side. There are a few fine spines near the tip ventrally. It extends well beyond the last transverse process.

Chelifori: Three-jointed, the 1st short, cylindrical, the 2nd narrow at the base, long at the end, trumpet shaped, bearing a large lateral spine and series of sharp hairs along its distal end, which is like a rim which encloses the small 3rd joint, which fits into the end of the trumpet-shaped 2nd joint.

Palpi: Nine-jointed, the 1st small, the 2nd and 4th long. The 2nd bears a few fine hairs near its end. The 3rd is small, about like the 1st. The 4th bears 3 sharp spines on its inner margin, and several on the outer margins include a small fleshy point. The distal end of this joint is very hairy. The remaining joints are small and bear tiny hairs, especially at the end of the last and on the outer sides of the others. This appendage is much more slender than the chelifori.

Ovigers: Nine-jointed. The 1st is short and rather thick, the 2nd is long and thick, the 3rd and 4th are long, slender, and curved, especially the 3rd. The 5th is short, thick, and covered on all sides with small hairs. The next 3 joints are more slender but of similar length. All have many tiny hairs. The 9th joint is very small and ends in 2 small, sharp spines.

Ambulatory appendages: Moderately long, moderately heavy, with many complex spines. The 1st and 3rd coxal joints are smaller than the 2nd. The femur and 1st tibia are about the same length. The 2nd tibia is longer. The 1st tarsus is moderately developed, the 2nd is heavy, somewhat curved, about half the length of the 2nd tibia. The unpaired claw is $\frac{2}{3}$ the length of the 2nd tarsus. At the basal joint of the 1st tarsus there are several strong teeth. At the basal ventral part of the 2nd tarsus there are 3 strong teeth, followed by an even row of 15 or more regular, rather smaller teeth or hairs. This joint bears a few lower hairs dorsally and laterally.

Color: Straw, with lighter brown in the heavily chitinized parts.

There is a little knob bearing spines in each transverse process dorsally on its distal end. The 1st coxal joint bears a number of compound spines directly at its distal end. The 2nd coxa bears several spines. The 3rd coxa bears a few short hairs about its margin. The femur is curved, bellowed out dorsally, and projects vertically. In the middle of the shaft laterovertically is a pair of large upward-extending spines. There are a few scattered compound spines here and there, and at the distal end near the joint there are 3 large compound spines with 1 or more smaller ones behind each of the larger. The 1st tibia bears 2 areas of large spines on its upper margin, 6 or more at the proximal end, 3 being especially large, composed of at least 4 large distal spines, a few smaller ones in rows, and a few short hairs. The 2nd tibia bears a group of large compound spines of various lengths, especially on its proximal end. There are about 8 of these, approximately in 2 rows, the vertical ones being the largest. There are a few scattered spines, mostly smaller toward the distal end on the outer side. The under sides of the 2 tibiae bear many fine hairs, especially numerous on the 2nd tibia.

Type: A female from a group of three, U.S. National Museum, no. 532, in the San Francisquito Bay, Lower California, sand and kelp, March 2, 1936, 26 fms., Hancock Expedition, accession no. 139772. Another male of the same species with eggs, U.S. National Museum, Marchena Island, Galapagos, shore, reef and spit, north end of Island, December 2, 1934, Hancock Expedition, no. 131571. This species resembles *N. spinosissima* most closely. It differs in having 2 dorsal spines instead of 3. It also has a cheliforus more trumpet shaped, with the 3rd joint hidden. Its abdominal appendage does not have so many spines, and the spines on the legs, although quite similar in arrangement, have many differences. The little limbs with spines on the dorsal distal surfaces of the

lateral appendages are also different. The lateral appendages are longer and better separated in this new species. The spines on the feet differ also, and the ocular tubercle in the new species is much larger and more prominent.

Measurements: Base of chelifori to end of 1st joint of legs, 1.2. Total length to end of last transverse process, 3. Length of proboscis, 2 by 0.8. Total length of body and proboscis, 5. Length of lateral process, 1.1. Width of body below, 0.4. Total width of body, 2.9. Length of abdomen, 0.2 to 0.4. Chelifori, 1st joint, 0.3; 2nd, 1.5; 3rd, 0.1. Palpi, 1st joint, 0.15; 2nd, 1.1; 3rd, 0.15; 4th, 0.16; 5th, 0.3; 6th, 0.4; 7th, 0.2; 8th, 0.5; 9th, 0.4. Ovigera, 1st joint, 0.5; 2nd, 1; 3rd, 2.5; 4th, 0.1; 5th, 0.5; 6th, 0.3; 7th, 2.5; 8th, 0.2; 9th, 0.05. Ambulatory legs, 1st joint, 0.1; 2nd, 0.2; 3rd, 1.4; 4th, 3; 5th, 2.5; 6th, 2.5; 7th, 0.3; 8th, 1.5; under claw, 1. Spread, 29.3.

Genus EURYCYDE Schödte, 1857

Body relatively compact, with well-defined segments and unusually long lateral processes. Cephalic segment with little-developed frontal part and strongly prominent cervical process for attachment of the ovigera. Caudal segment horizontal, fusiform, expanded in its outer part. Ocular tubercle narrow, marked, distinctly marked eyes. Proboscis of medium size and fusiform, articulated by narrow neck, curved inward on the ventral side. Well-marked joint in the proboscis. Chelifori narrow, 2-jointed. Palpi greatly elongated, curved, 10-jointed. Ovigera usually 10-jointed, marginal spines in a double series serrated, terminal claws distinct. Ambulatory legs slender, with strong bristles. Coxal joints of the female swollen. Tarsal joint very small. Terminal claw short, without auxiliary claws.

Eurycyde longisetosa, new species

Plate 46

Diagnosis: Body compact, appendages slender, bearing very long hairs. Ocular tubercle cylindrical, with 2 very long hairs near the tip. Low teeth on the 2nd coxa below.

Description

Body: Rather compact, free from hairs, but granular. Suture lines well marked. Transverse processes well developed, not fused but very

close together, especially those of the 1st and 2nd pairs of ambulatory legs. Lateral processes about the width of the body between, transverse processes without spines or hairs.

Ocular segment: Well developed, narrow in front where it bears the chelifori. A little longer than the next 2 segments.

Ocular tubercle: High, cylindrical. It bears deeply pigmented eyes in its middle portion and has 2 very long hairs projecting from its end.

Proboscis: Two-jointed, the 1st cylindrical, shorter than the 2nd, which is bent upon it. The 2nd joint is thick in the center and tapers at the ends, especially the tip. In its central portion it is more than half as broad as long.

Abdominal segment: Long, cylindrical. It is larger than the 1st coxa and nearly as long as the 2nd coxa, including the length of the transverse process. It is much narrower than any and bears 6 very long hairs near its end.

Chelifori: Three-jointed, slender, but shorter than the palpi. The first joints are about equal in length, the 2nd is very much smaller. The 2nd joint bears 5 very long hairs which extend out laterally. The last joint bears 3 very long hairs.

Palpi: Ten-jointed. More slender than the chelifori. The first 2 joints very short, especially the 2nd. The 3rd and 5th are the longest. The rest are all small and bear hairs.

Ovigers: Ten-jointed. The first 2 joints are short; the 3rd is a little longer; the 4th and 5th are the long joints; the 6th is about half as long as the 5th. The remaining joints are small and bear 4 or more slender teeth on their inner margins. The last joint has 1 or 2 terminal or nearly terminal teeth. The last 5 joints all bear a few long hairs on their outer surfaces. The eggs were small—about 0.1 mm. in diameter.

Ambulatory appendages: The legs are moderately long and slender, especially the long joints. The coxal joints are nearly the same size. The femur is shorter than the tibial joints. The 2nd tibia is especially slender. The 1st coxal joint bears 2 large lateral spinelike processes. The 2nd and 3rd coxae bear rather long hairs. The femur bears a group of very long hairs at its distal end. The 1st tibia bears 2 groups of very long hairs, a few of which are plumelike.

The 2nd tibia bears several very long hairs in 2 groups of about 3 each, a few of which are plumelike. The 1st tarsus is well developed, is cylindrical, and has no long hairs. The 2nd tarsus is more than half as long as the 2nd tibia. It is thicker than the tibia in its center, but is

rather straight. It ends in a rather short, prominent claw. It bears several long hairs on its upper surface and slight indications of sinisterlike claws on its lower surface. Type of male from a lot of 3 males with eggs. U.S. National Museum, Station 423-35, Point Utria, Colombia, close to shore, north of Point, north of island, January 25, 1935, 20 fms., accession no. 131571. This species is much like *E. hispada* Kroyer, but the hairs seem very much longer, some 0.5 mm. or longer. In *hispada* no hairs are seen on the ocular eminence. There are 2 in this species. The 1st coxal joint does not have the long processes of this species. The hairs on the legs of this species are fewer, larger, and differently arranged.

Measurements: Base of the chelifori to 1st segment lines, 0.45; between 1st and 2nd segment lines, 0.2; 2nd and 3rd segment lines, 0.2; 3rd line to the end, 0.2. Total length not including proboscis, 1.05. Length of transverse process, 0.35; body width between transverse processes, 0.25; total body width, 0.95. Proboscis, 1st joint, 0.36; 2nd, 0.54 long by 0.12 to 0.3. Abdomen, 0.48 by 0.06 to 0.08; hairs on abdomen, 0.5. Ocular eminence, 0.225 by 0.1; hairs, 0.3. Chelifori, 1st joint, 0.3 by 0.075; 2nd, 0.30 by 0.04; 3rd, 0.075 by 0.05; hairs, 0.22. Palpi, 1st, 0.075 by 0.1; 2nd, 0.025; 3rd, 0.4 by 0.04; 4th, 0.125; 5th, 0.25; 6th, 0.075; 7th, 0.075; 8th, 0.075; 9th, 0.065; 10th, 0.065. Ovigera, 1st joint, 0.1 by 0.1; 2nd, 0.15 by 0.1; 3rd, 0.175 by 0.087; 4th, 0.45 by 0.075; 5th, 0.4 by 0.088; 6th, 0.3 by 0.25; 7th, 0.15 by 0.075; 8th, 0.15 by 0.05; 9th, 0.1 by 0.05; 10th, 0.1 by 0.065. Ambulatory legs, 1st joint, 0.2 by 0.15; 2nd, 0.2 by 0.1 to 0.2; 3rd, 0.2 by 0.15; 4th, 0.575; 5th, 0.85; 6th, 0.85; 7th, 0.675 by 0.04; 8th, 0.5 by 0.05 to 0.052. Claw, 0.25 by 0.037.

Family *Pycnogonidae* Dohrn

The cheliforus or first appendage pair is lacking. The palpus or 2nd appendage pair is lacking. The ovigera or 3rd appendage pair is found only in the male. It is 10-jointed, the last joint is a terminal claw. The body is compact, the legs thick and comparatively short. There are usually 4 pairs of legs, sometimes 5. The sex openings in both sexes are in the 4 legs, in the last 4 if there are 5 pairs of legs.

Genus *PYCNOGONUM* Brunnich, 1764

Trunk stout, legs short, ovigera only in the male. First tarsal joint small. Claws simple.

***Pycnogonum hancocki* Schmitt, 1934**

Plate 47

Pycnogonum hancocki Schmitt, Jour. Wash. Acad. Sci., vol. 24, 1934, pp. 65-67, fig. 2.

Diagnosis: Color light tan, with marked brownish reticular marks. Three rounded tubercles on the middle line of the body. Legs rather smooth, not with rounded knobs.

Description

Trunk: The 1st segment is equal to the 2nd, 3rd, and 4th combined. Its greatest width over the lateral processes. The greatest width of the 2nd segment is equal to the length of the first 2 trunk segments taken together. The 3rd segment is about as wide as the length of the 1st trunk segment together with $\frac{1}{3}$ of the 2nd. Caudal lateral processes are fused for part of their length.

In a line behind the moderately high, rounded ocular tubercle are 3 rounded tubercles, each smaller than the ocular. That of the 3rd trunk segment is the larger. The 1st is at the caudal margin of the 1st trunk segment. The 2nd, a little larger than the 1st, has a similar position, and on the last segment there is very slight indication of an elevation. The distal margins of the lateral processes are slightly more coarsely granulated than the rest of the body surface.

Caudal segment: This is not conspicuous. It is about $\frac{2}{5}$ the proboscis in length and projects beyond the caudal line of the rather large lateral process of the 4th pair of legs.

Eye tubercle: The eye tubercle is about half as high as the median dorsal tubercles and is provided with 4 dark eyes.

Proboscis: This is nearly cylindrical, truncate, and a little narrower in front than behind. It is about $2\frac{1}{4}$ times as long as its greatest width. It is very slightly longer than the first $2\frac{1}{2}$ segments taken together.

Ambulatory legs: The distal margins of the 1st coxae of all the ambulatory legs are a little enlarged, owing to a small nodule on either side of the brown line of the reticulations which divide the white area in two. At about the distal portion of the proximal half of the 2nd coxae of the 2nd and 3rd legs there is a small nodule of size similar to the last mentioned. The 2nd coxa of the 1st leg lacks this elevation, the 2nd coxae of the 4th pair each have a pair of small rounded tubercles, one on the mid-dorsal line, and the other transversely in the line a little behind the median axis of the joint. The rest of the leg joints are uniformly granu-

late as is the rest of the body. In the 3rd leg the 3 coxal joints are more or less subequal in length as are the femoral and 1st tibial joints.

The 2nd tibial joint and the 2nd tarsal joint, not counting the claw, are about the same length. On the ventral measurements the 1st tarsal joint is very slightly longer than the terminal claw. The 2nd tibial joint is about $\frac{2}{3}$ the length of the 1st, and both coxal joints are equal to $\frac{3}{4}$ the femoral joint in length. The inferior borders of the tarsal joints, and to a less degree the distal ends of the tibial joints, are finely spinulate.

Color: Light tan, with reticular marks, deep red brown. Ocular tubercle dark, with deeply pigmented eyes.

I have examined one specimen, a male from Santa Cruz Island of the Galapagos group. This specimen carried a single bunch of eggs which occupied about all the ventral area of the animal. The eggs were just a shade under 0.1 mm. in diameter.

Measurements: Total length, 6.25. Proboscis, 3 long by 1 wide. First body segment, 1 long; 2nd and 3rd segments, the same as the 1st; 4th, 1.25. Width of the central part of the body, 1.5; lateral appendages, 1 on each side of this. Ambulatory legs a little longer in front, the posterior legs progressively shorter after the 1st pair. Length of joints in the 1st leg, 1st joint, 0.75 by 1 broad; 2nd, 0.7 by 1; 3rd, 0.7 by 0.75; 4th, 1.5 by 1; 5th, 0.2 by 1; 6th, 1.25 by 0.75; 7th, 0.25 by 0.25; 8th, 0.1 by 0.3. Claw, 0.5 by 0.2. The ovigers, not previously described, are 8-jointed, counting the large terminal claw as one. In measurements the joints are as follows: 1st joint, 0.175 by 0.2 broad; 2nd, 0.15 by 0.175; 3rd, 0.3 by 0.3; 4th, 0.4 by 0.3; 5th, 0.35 by 0.15; 6th, 0.4 by 0.425; 7th, 0.275 by 0.175. The claw is 0.25 by 0.75 at the base.

This species differs from many other forms of the same genus because of its reticulation. It also has fewer tubercles on the legs than *P. indicum*, *madagascarensis*, and *mucronatum*. It differs from the first in lacking the armed ridge back of the ocular tubercle and in having a subcylindrical proboscis instead of a conical one. It also has very low dorsal tubercles.

Schmitt describes the species from a female taken with a smaller male with eggs, collected at low tide on a small rocky reef, off shore north of Tagus Cove, Albemarle Island, Galapagos, lat. $0^{\circ} 14' S.$, Station 65-33, Feb. 9, 1933. It measured: proboscis, 2.4 by 0.9; trunk, not counting lateral processes, 2.6; caudal segment, 1.

Two other females were one from Chatham Island, Jan. 31, 1933, from dredging 2-3 fms., east of Wreck Bay, Station 41-33, and one, Station 59-33, from a rocky shore east of Cormorant Point, Charles Island,

Galapagos, Feb. 6, 1933. One male, Station 65-33, Feb. 9, 1933, from a reef on Albemarle Island, north of Tagus Cove, Galapagos. The body was 3.5; the proboscis, 2.5; the spread, 10. Found on a sponge.

Two females with body length, 3.5; proboscis, 3, Station 81-33, Indefatigable Island, Conway Bay, Galapagos, Feb. 17, 1933.

Seven males and 7 females, the largest female, 4; proboscis, 2.5. Several of both sexes were very light colored. South Seymour Island, Galapagos, Jan. 14-18.

One male, length, 3.5; proboscis, 2, Station 333-34, James Island, shore, rocky ledges, 2 miles south of James Bay, Dec. 11, 1934.

One male, Station 65-33, Albemarle Island, reef north of Tagus Cove, well out from shore, U.S.N.M. accession no. 122445, Galapagos Islands, Feb. 9, 1933.

One male, young, Station 214-34, Cape San Francisco, Ecuador, dredging near rocks, mud and rocks, 2 fms., Feb. 11, 1934.

Fourteen females, 18 males, Station 10, James Bay, Galapagos, Jan. 11, 1932.

Four specimens, Duncan Island, Galapagos, *Albatross* voyage, 1887-88, Apr. 13.

Two males, 3 females, Station 85-33, North Seymour Island, Galapagos, shore collecting, under rocks and crevices, Feb. 18, 1933.

Eleven females and young, Station 82-33, Conway Bay, Indefatigable Island, Galapagos, small island, shore, Feb. 17, 1933.

***Pycnogonum panamum*, new species**

Plate 48

Diagnosis: Brown, reticulated. Proboscis rather pointed at the end. The proboscis is longer than the body.

Description

Body: Rather heavy, disc shaped. Lateral processes short, not widely separated. The dorsal spines as long or higher than the ocular tubercle.

Ocular segment: Short, not much longer than the 2nd segment.

Ocular tubercle: Moderately high, pointed, eyes dark, well developed.

Proboscis: Long, tapering toward the tip, and bent under slightly; longer than the total length of the body. Reticulated in squarish areas, a dozen or more from the base to the tip.

Abdomen: Short, broad, extending from the last transverse processes to beyond the 1st coxal joint. Provided with a few small hairs.

Ovigers: Slender, the joints not very different in length. The 5th and 7th joints seem the longest.

Ambulatory appendages: Rather short and heavy. The 1st joint is about like the 3rd coxal joint. The femur and tibiae are not very long, the first two longer than the 2nd tibia. The 1st tarsus is rather short; the 2nd is nearly as long as some of the long leg joints. All the joints except the last two are reticulated, marked by dark brown lines.

The claws are about half as long as the last tarsal joints.

Color: Brown. Reticulated.

This species is nearest to *Pycnogonum hancocki* Schmitt, found in many places about the Galapagos Islands, but differs in having the proboscis longer than the body. It is also of different shape, being narrowed toward the tip in this species and bent downward. The reticulations differ in the 2 species, and the claws are long in this species.

Material: Type, a male, Station 249-34, Bahia Honda, Panama, outside of isle south of Bay, Feb. 22, 1934, dredged, 15-20 fms. Another male, Station 457-35, Secas Islands, Panama, Feb. 6, 1935, 12 fms.

Measurements: Length of body from front line to end of last lateral process, 1.92; width of the body between processes, 0.48; length of lateral process, 0.36; total width, 1.2. Length of proboscis, 1.8; width at base, 0.48; at tip, 0.36. Leg, 1st joint, 0.36 by 0.48; 2nd, 0.48 by 0.36; 3rd, 0.36 by 0.36; 4th, 0.84 by 0.36; 5th, 0.96 by 0.36; 6th, 0.72 by 0.24; 7th, 0.12 by 0.12; 8th, 0.72 by 0.12 to 0.18. Claw, 0.36 by 0.06. Spread, 10. Oviger, 1st joint, 0.10; 2nd, 0.15; 3rd, 0.10; 4th, 0.15; 5th, 0.20; 6th, 0.15; 7th, 0.20; 8th, 0.1.



PLATE 35

Nymphon pixellae Scott (after Scott).

1, dorsal view; 2, profile view; 3, ocular tubercle; 4, terminal joints of leg; 5, spines on terminal joints of leg; 6, dorsal view, walking-legs removed; 7, terminal joints of ovigerous leg; 8, spine of oviger; 9, palp; 10, chela; 11, oviger with egg-mass.

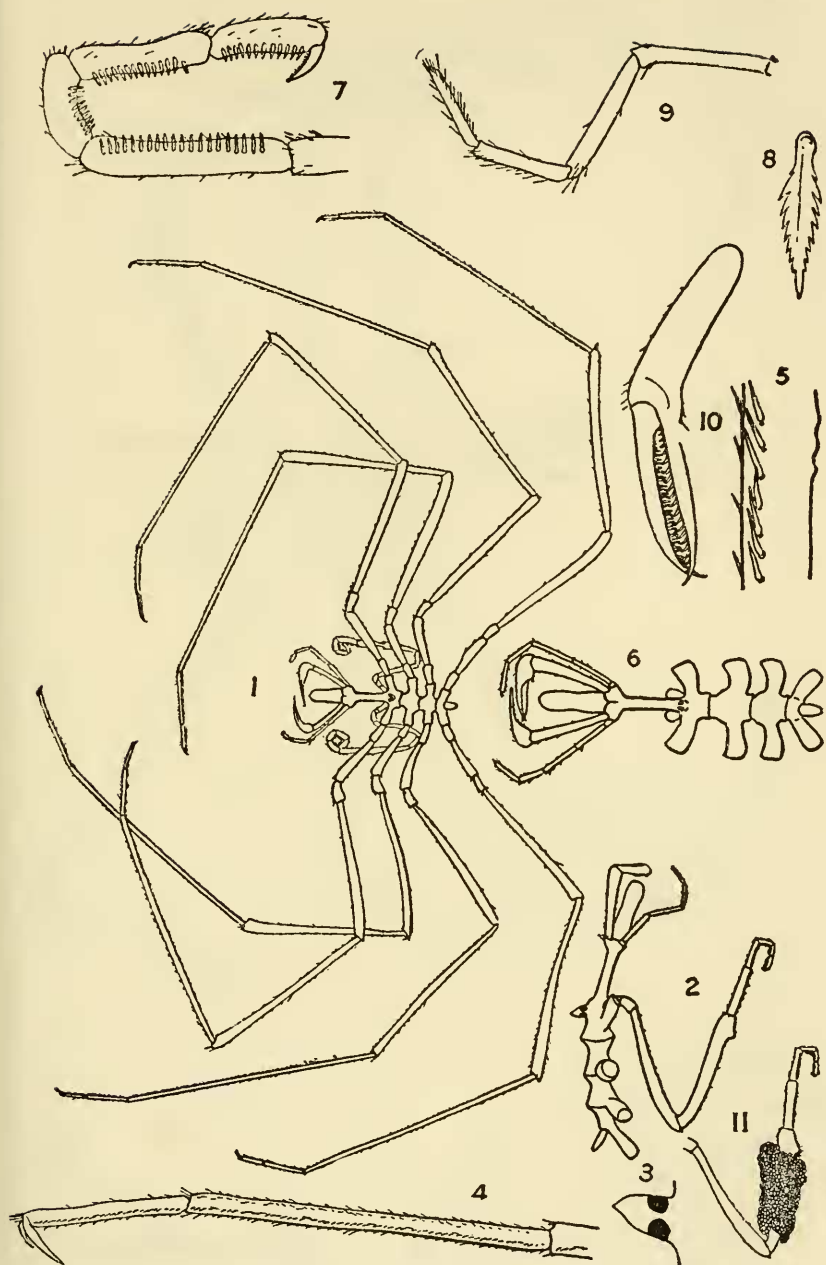


PLATE 36

Callipallene californiensis (Hall).

Scale at left equals 1 mm. Cheliforus, terminal leg joints, and oviger at different magnifications.

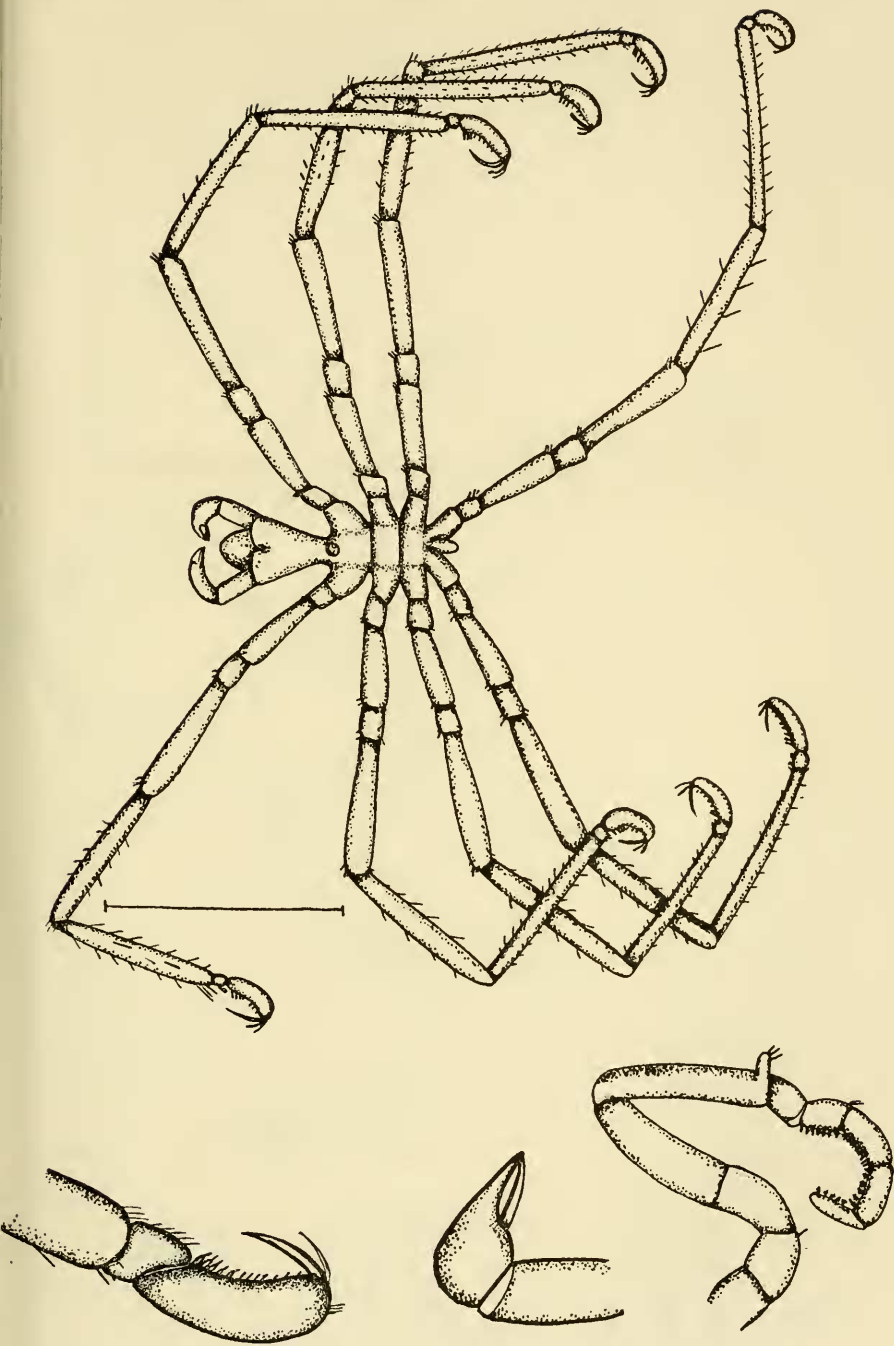


PLATE 37

Anoplodactylus erectus Cole.

Scale at the left 1 mm. Tip of abdomen, ocular tubercle, cheliforus, tip of a leg, tip of oviger at different magnifications.

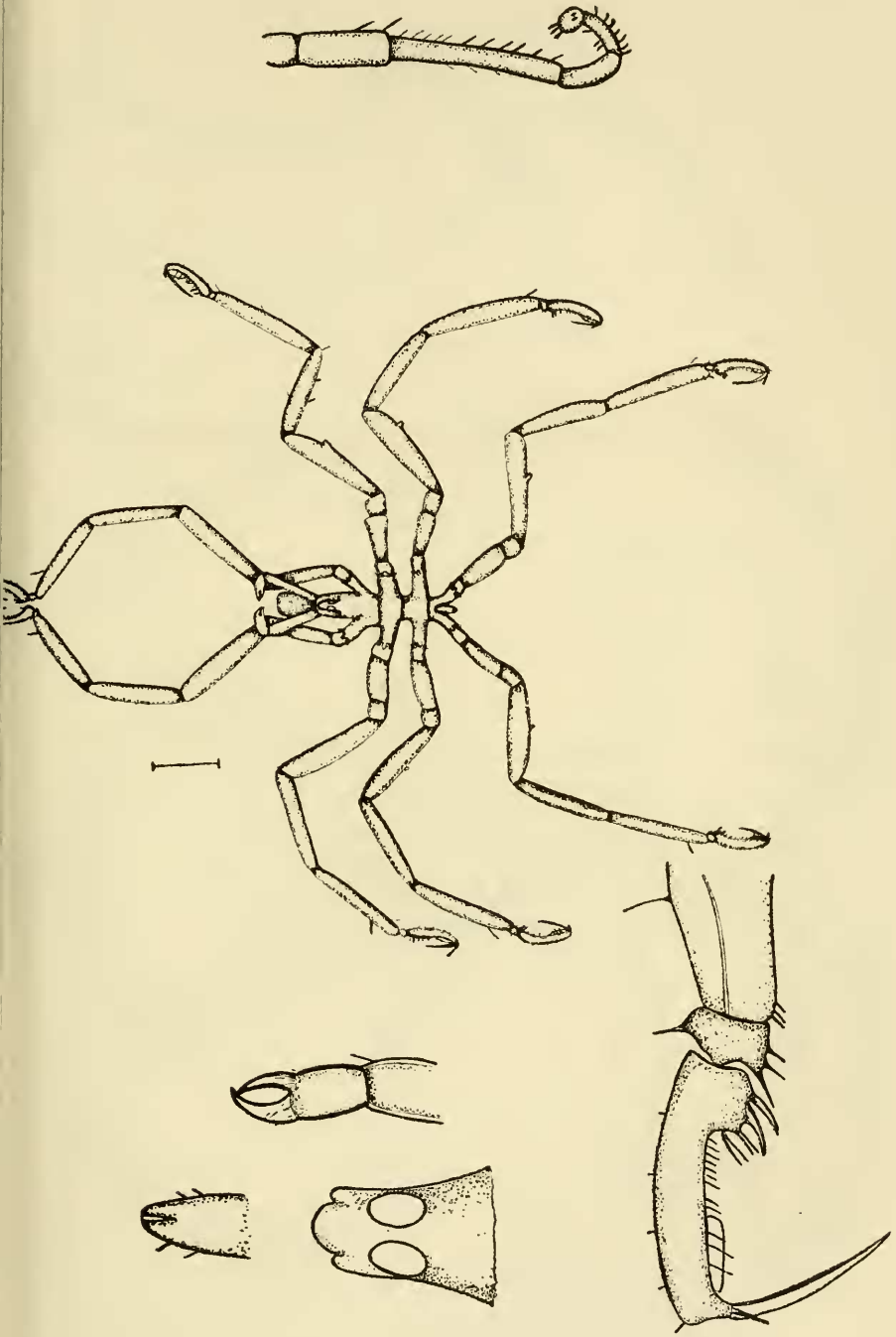


PLATE 38

Anoplodactylus californicus Hall.

Scale 1 mm. Ocular tubercle, terminal leg joints at different magnifications.

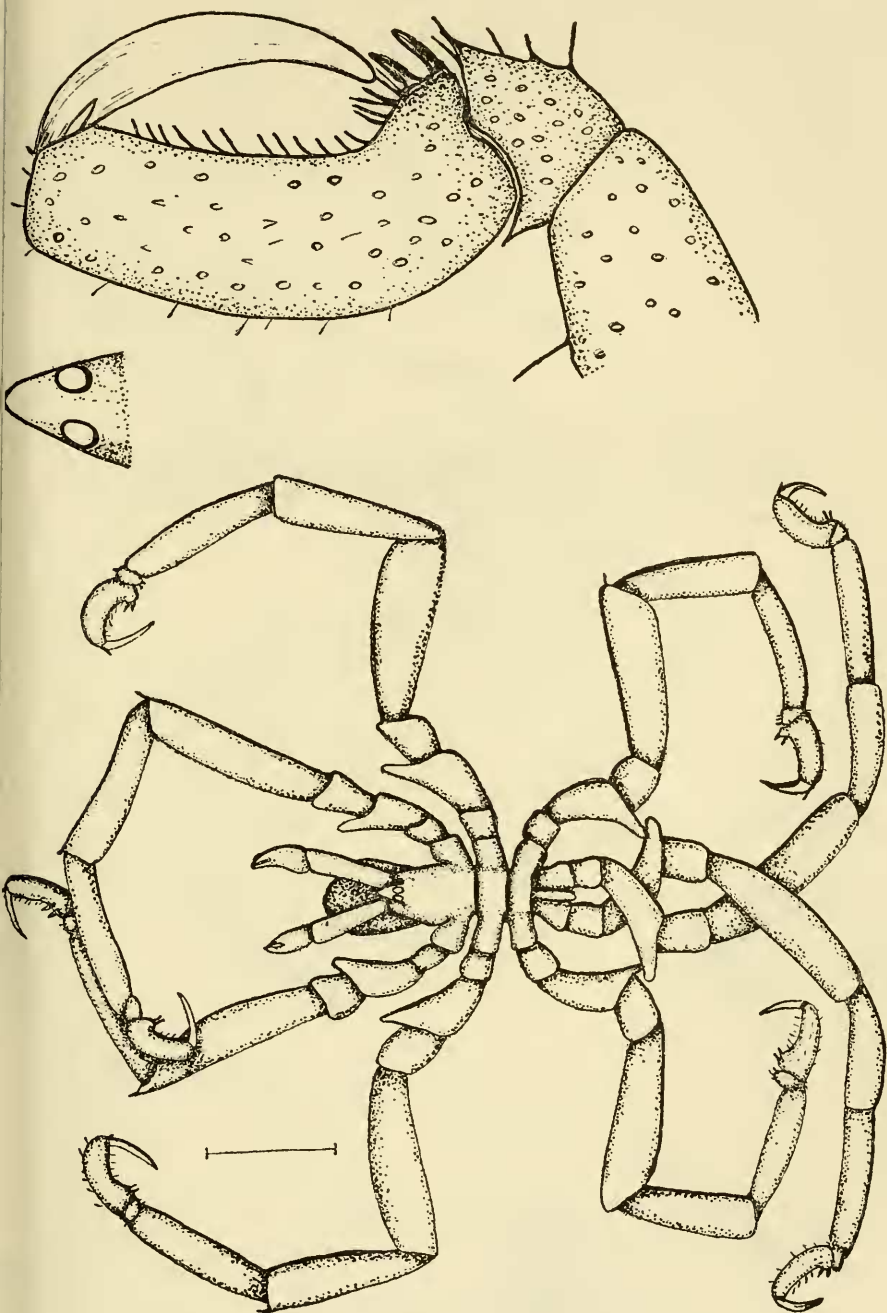


PLATE 39

Anoplodactylus robustus Hilton.

Scale 1 mm. for the body alone. Ocular tubercle, gland opening, attachment discs under the proboscis, and terminal leg joints at different magnifications.

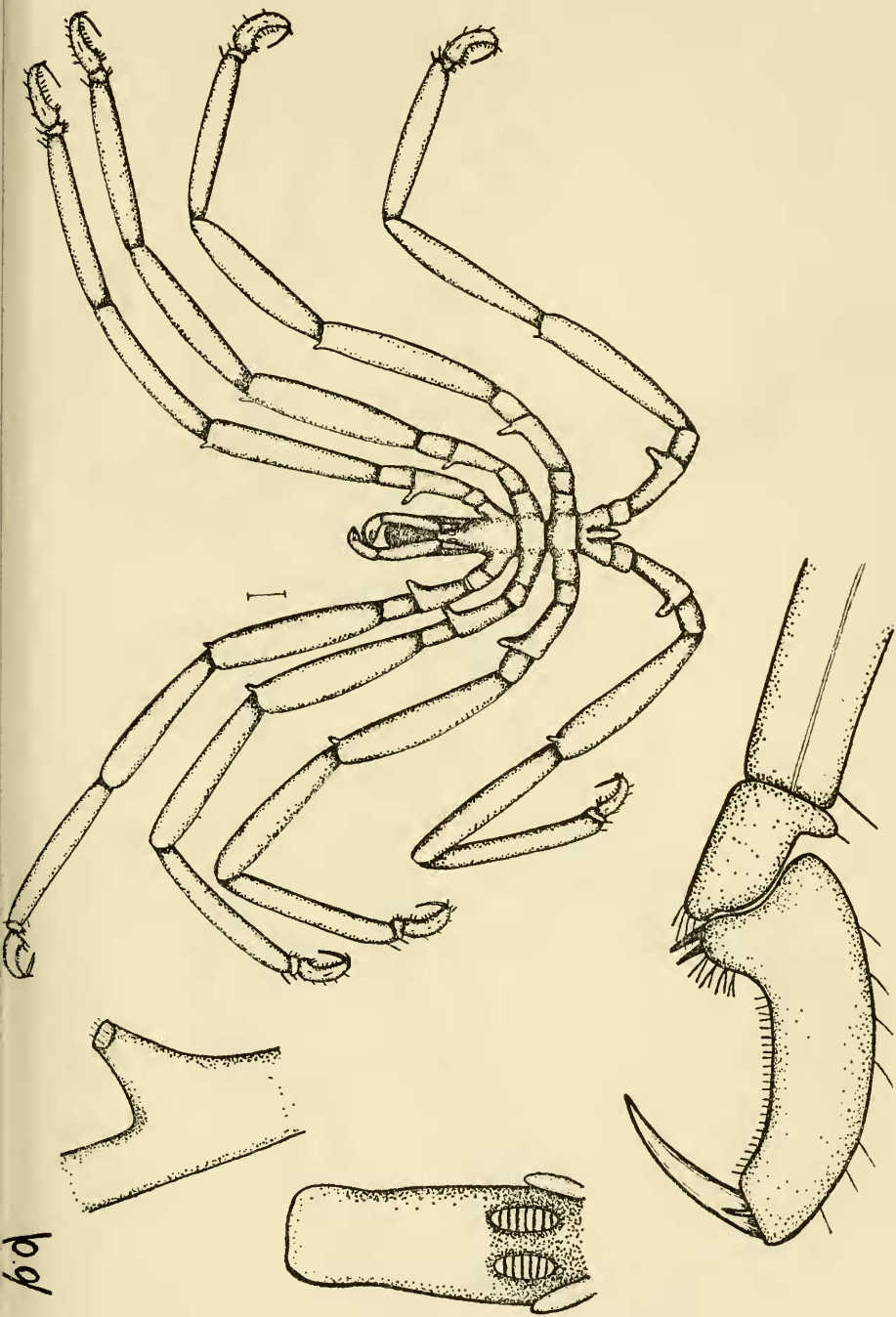


PLATE 40

Tanystylum californicum Hilton.

Scale equals 1 mm.

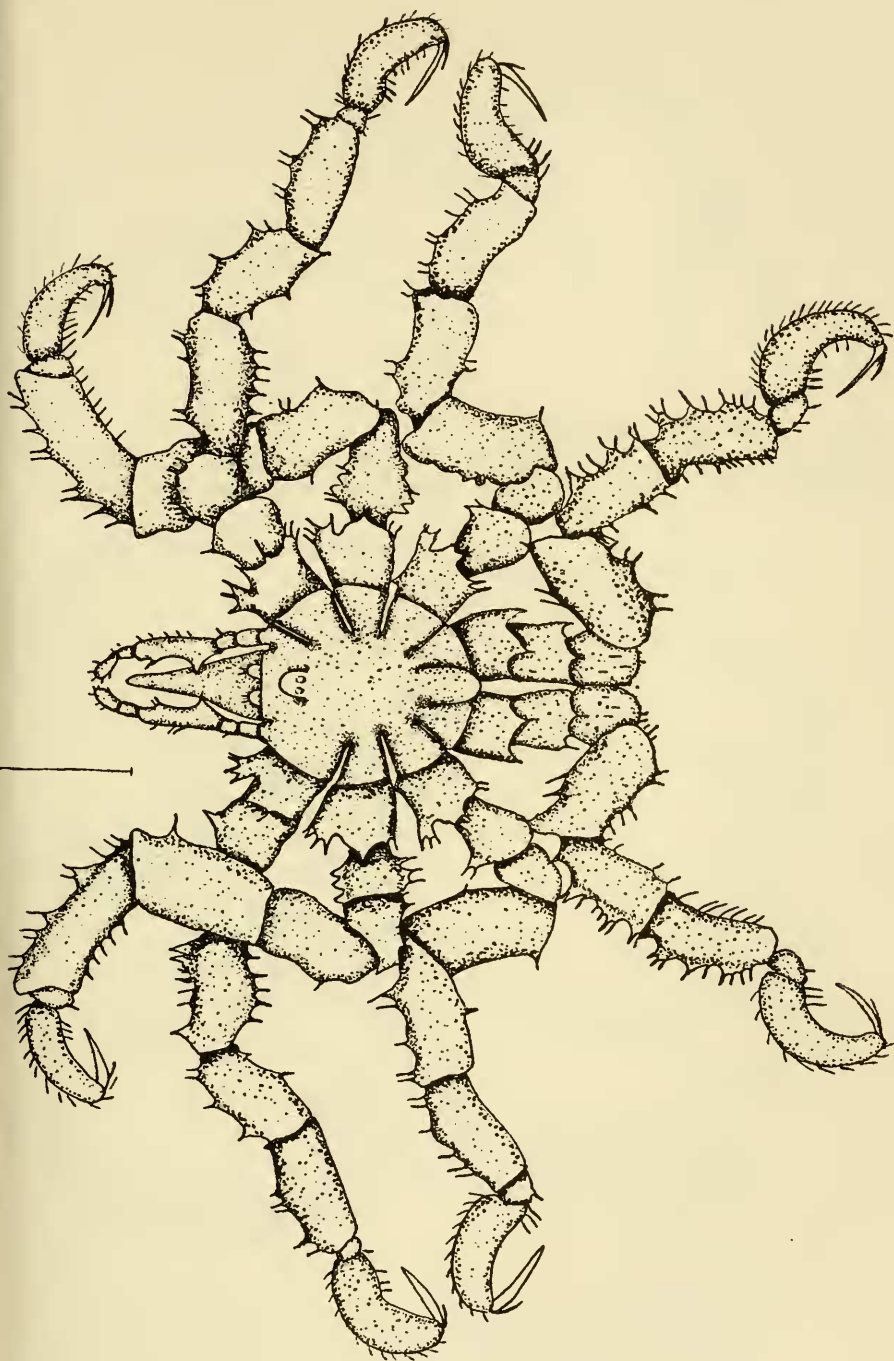


PLATE 41

Ammothea latifrons Cole.

Scale 1 mm. for the body alone. Ocular tubercle, palpus, cheliforus, oviger of male above, female oviger below, terminal leg joints, spine.

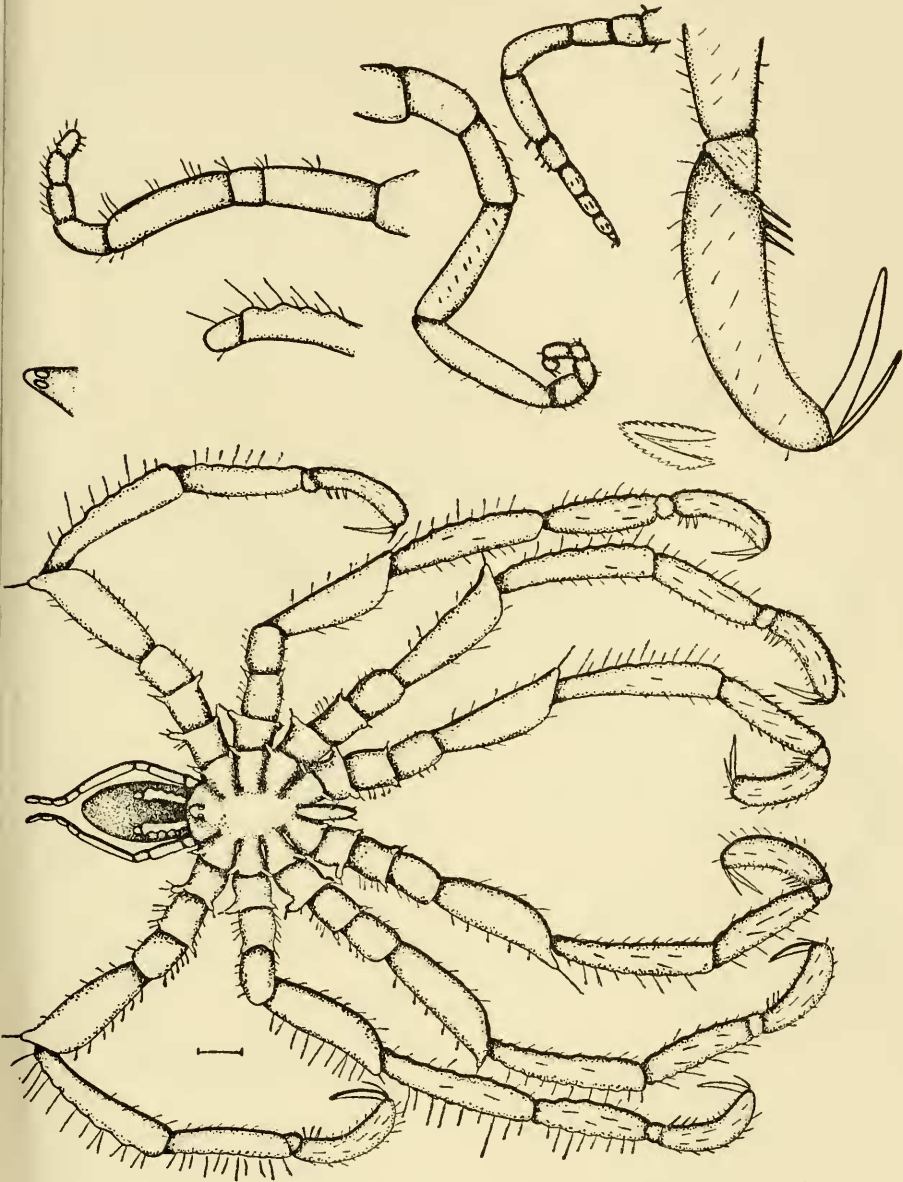


PLATE 42

Ammothella bi-ungiculata (Dohrn).

Scale equals 1 mm.

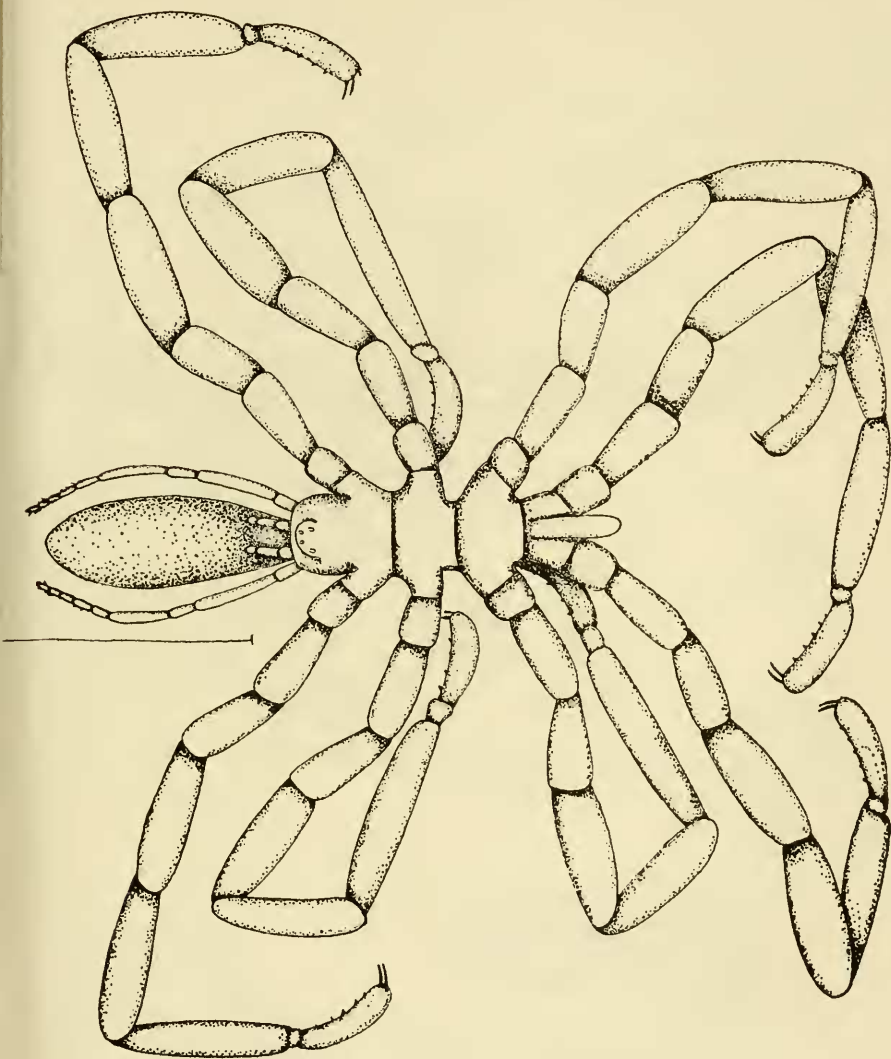


PLATE 43

Ammothella heterosetosa, new species.

Scale at left 1 mm. Small figures at other magnifications. Oviger, surface of the body, individual cylindrical hairs. Cheliforus.

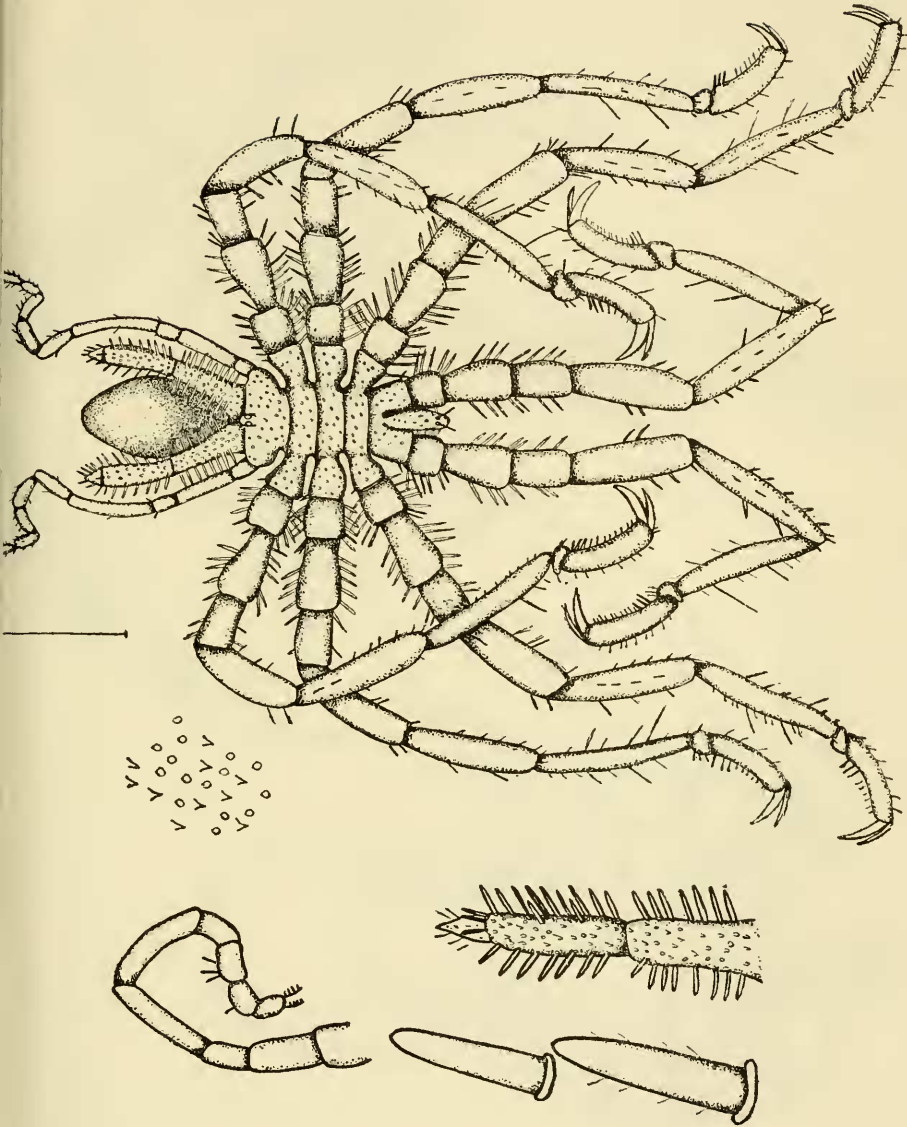


PLATE 44

Nymphopsis spinosissima (Hall).

Scale equals 1 mm.

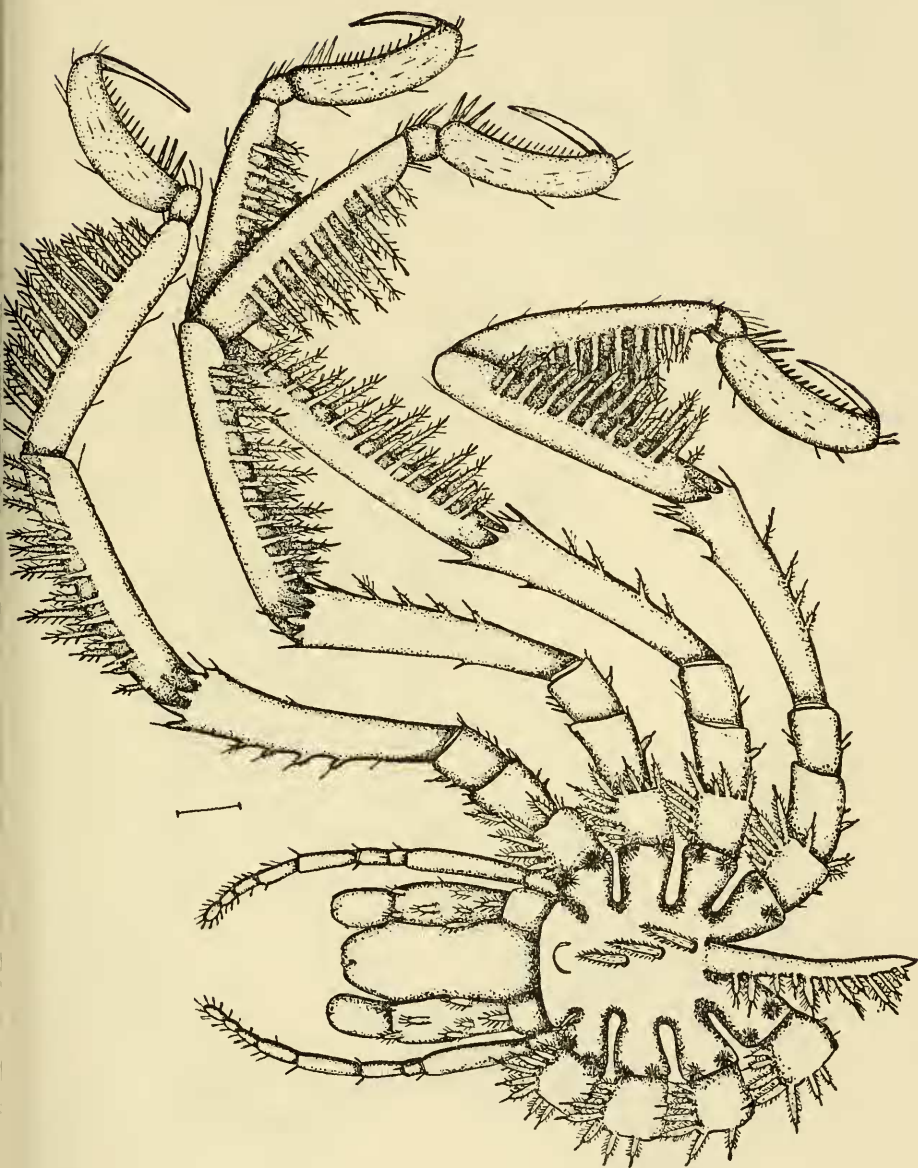


PLATE 45

Nymphopsis duodorsospinosa, female. Hilton.

Scale equals 1 mm. for body alone. Palpus and cheliforus different scale.

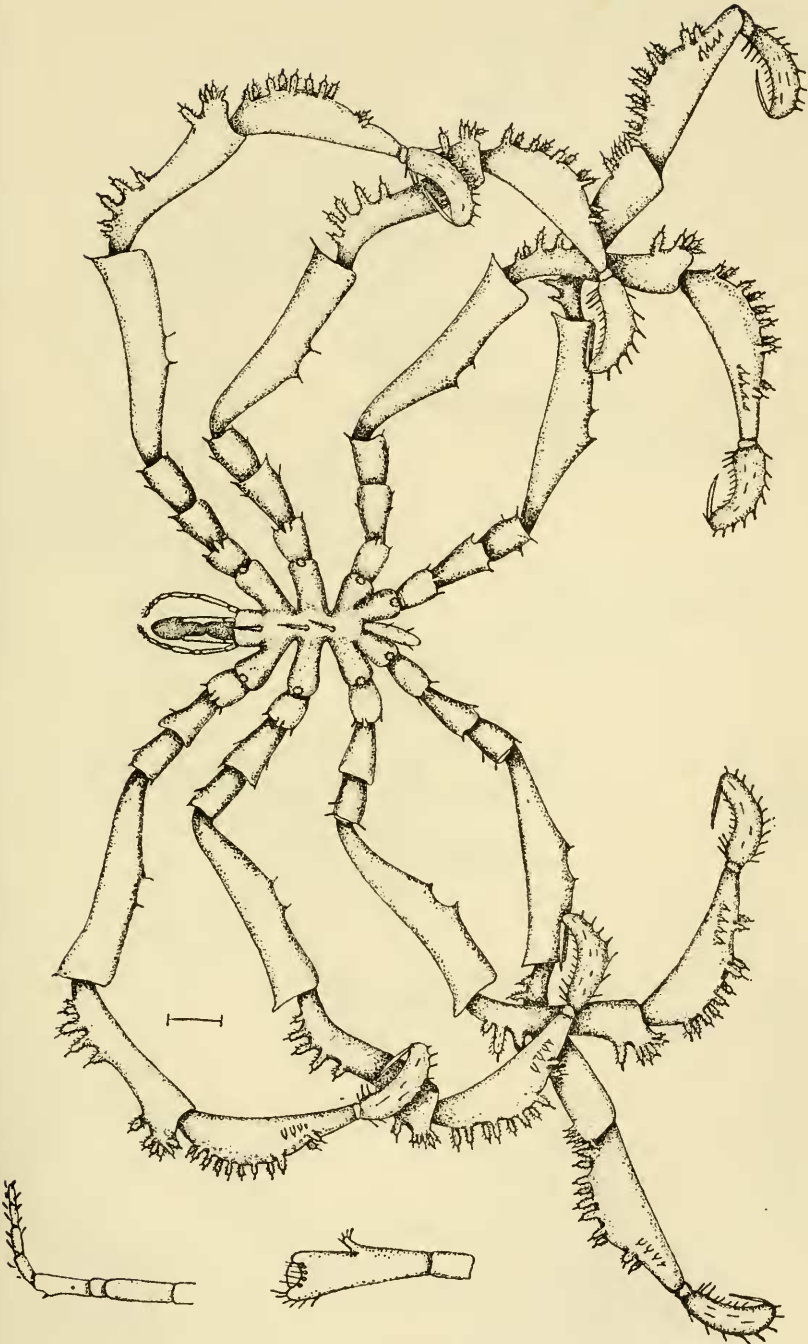


PLATE 46

Eurycyde longisetosa, new species.

Scale 1 mm.

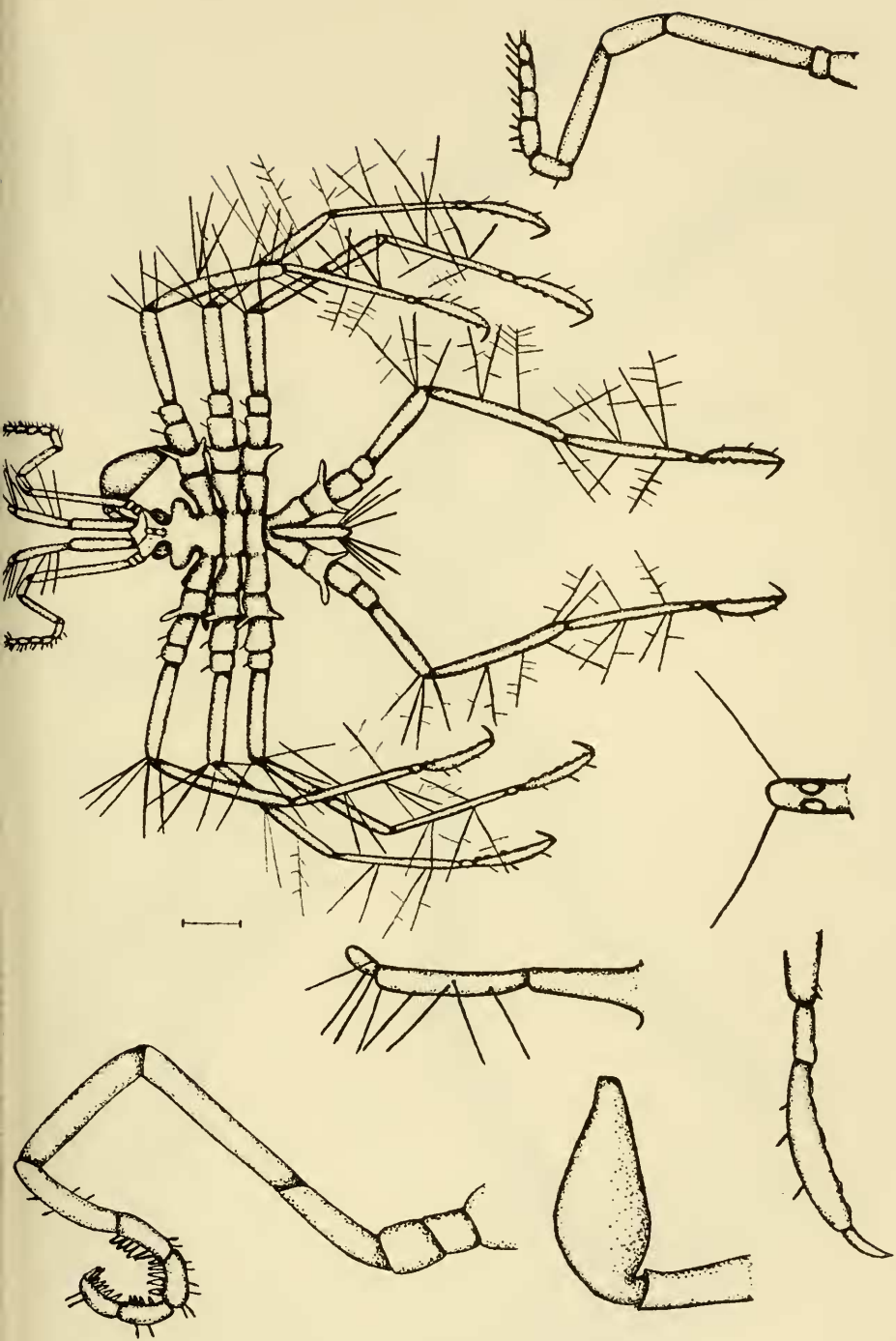


PLATE 47

Pycnogonum hancocki Schmitt.

Scale equals 1 mm.

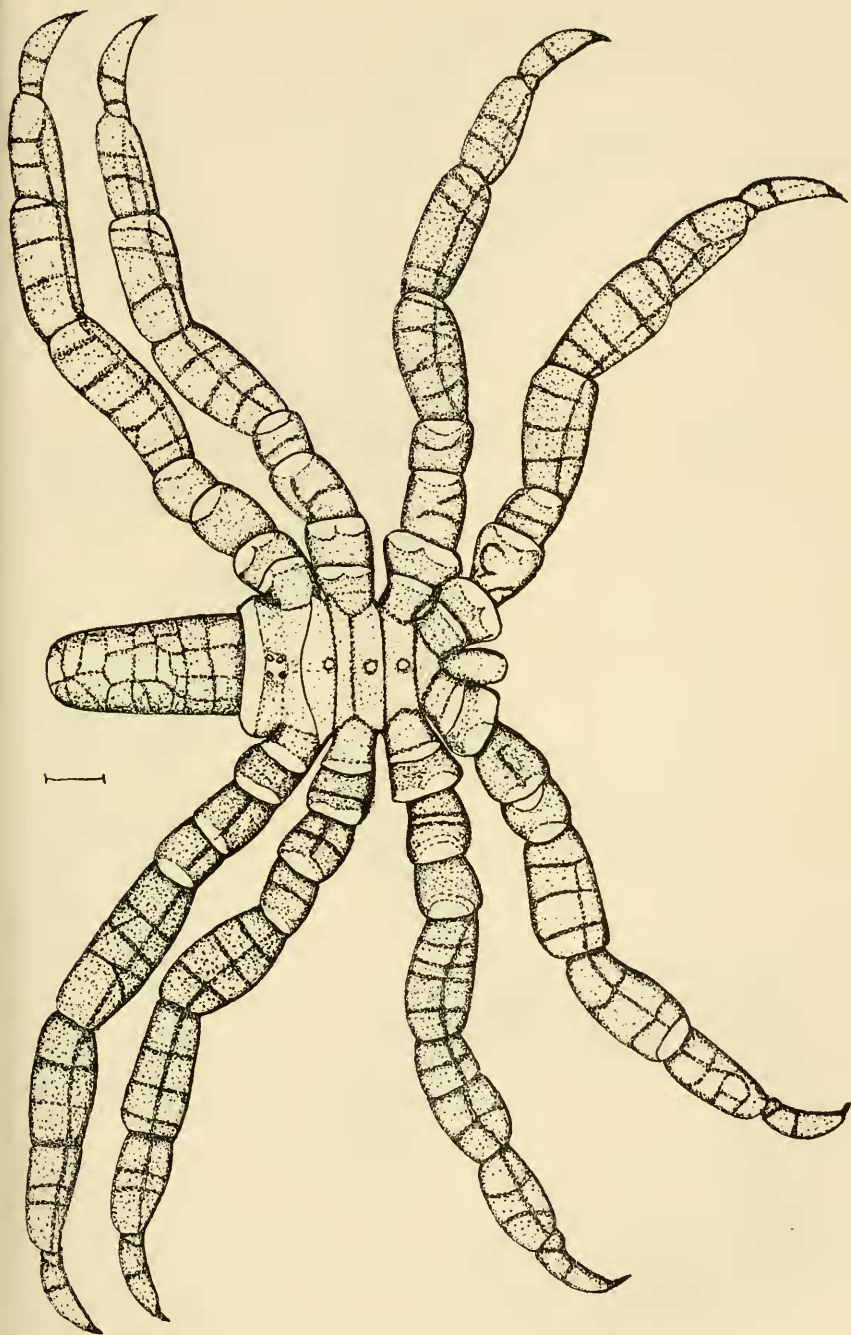


PLATE 48

Pycnogonum panamum, new species.

Scale equals 1 mm. Ocular eye elevation and one leg enlarged at different scales.

